

SEQUENCE LISTING

<110> THE GOVERNMENT OF THE UNITED STATES OF AMERICA AS
REPRESENTED BY THE SECRETARY OF THE DEPARTMENT OF HEALTH AND
HUMAN SERVICES
Collins, Peter L.
Biacchesi, Stephane
Buchholz, Ursula
Skiadopoulos, Mario H.
Murphy, Brian R.

<120> RECOMBINANT HUMAN METAPNEUMOVIRUS AND ITS USE

<130> 4239-67784

<150> US 60/451,119
<151> 2003-02-28

<150> US 60/478,667
<151> 2003-06-13

<160> 36

<170> PatentIn version 3.2

<210> 1
<211> 13335
<212> DNA
<213> human metapneumovirus

<400> 1
acgcgaaaaa aacgcgtata aattaagtta caaaaaaaca tgggacaagt gaaaatgtct 60
cttcaaggga ttcacctgag tgatctatca tacaagcatg ctatattaaa agagtctcag 120
tatacaataa agagagatgt aggcacaaca acagcagtga caccctcatc attgcaacaa 180
gaaataacac tattgtgtgg agaaattcta tatgctaagc atgctgatta caaatatgct 240
gcagaaatag gaataacaata tattagcaca gctctaggat cagagagagt acagcagatt 300
ctaagaaact caggcagtga agtccaagtg gtttaacca gaacgtactc cttggggaaa 360
gttaaaaaaca acaaaggaga agatttacag atgttagaca tacacggagt agagaaaagc 420
tgggtggaag agatagacaa agaagcaaga aaaacaatgg caacttgct taaagaatca 480
tcaggcaata ttccacaaaa tcagaggcct tcagcaccag acacacctat aatcttatta 540
tgtgttaggtg ccttaatatt taccaaacta gcatcaacta tagaagtggg attagagacc 600
acagtcagaa gagctaaccg tgtactaagt gatgcactca aaagataccc taggatggac 660
ataccaaaaa tcgctagatc tttctatgtat ttatttgaac aaaaagtgtta ttacagaagt 720
ttgttcattt agtatggcaa agcattaggc tcatcctcta cagggcagcaa agcagaaagt 780
ttattcgatc atatattcat gcaagcttac ggtgctggtc aaacaatgct gaggtgggaa 840
gtcattgcca ggtcatctaa caatataatg ttaggacatg tatctgtcca agctgagtt 900

aaacaagtca cagaagtcta tgacctggtg cgagaaatgg gcccgtaaatc tgggctccta	960
catttaaggc aaagccaaa agctggactg ttatcaactag ccaattgtcc caactttgca	1020
agtgttggc tcggcaatgc ctcaggctta ggcataatag gtatgtatcg cgggagagtg	1080
ccaaacacag aactatttc agcagcagaa agctatgcca agagttgaa agaaagcaat	1140
aaaattaact ttttttcatt aggactcaca gatgaagaaa aagaggctgc agaacactt	1200
ctaaatgtga gtgacgacag tcaaaatgat tatgagtaat taaaaaagtgg ggacaagtca	1260
aatgtcatt ccctgaagga aaagatattc ttttcatggg taatgaagcg gcaaaattgg	1320
cagaagcttt ccaaaaatca ttaagaaaac ctagtcataa aagatctcaa tctattatag	1380
gagaaaaagt gaacactgta tctgaaacat tggaaattacc tactatcagt agacctacca	1440
aaccgaccat attgtcagag ccgaagttag catggacaga caaagggtgg gcaatcaaaa	1500
ctgaagcaaa gcaaacaatc aaagtatgg atcctattga agaagaagag tttactgaga	1560
aaagggtgct gcccctccagt gatggaaaaa ctcctgcaga aaagaagttg aaaccatcaa	1620
ccaatactaa aaagaaggtc tcatttacac caaatgaacc agggaaaatac acaaagggtgg	1680
agaaagatgc tctagacttg ctttcagaca atgaagaaga agatgcagaa tcctcaatct	1740
taaccttcga agaaagagat acttcatcat taagcattga agccagacta gaatcgattg	1800
aggagaaatt aagcatgata ttagggctat taagaacact caacattgct acagcaggac	1860
ccacagcagc aagagatggg atcagagatg caatgattgg cataagggag gaactaatag	1920
cagacataat aaaagaagcc aaggaaaaag cagcagaaat gatggaagaa gaaatgaacc	1980
agcggacaaa aataggaaac ggtagtgtaa aattaactga aaaggcaaag gagctcaaca	2040
aaattgttga agacgagagc acaagtggtg aatccgaaga agaagaagaa ctaaaagaca	2100
cacagaaaaa taatcaagaa gatgacattt accagttaat tatgttagtt aataaaaata	2160
aaaaatggga caagtgaaaa tggagtccta tctggtagac acctatcaag gcatccctta	2220
cacagcagct gttcaagttt atcttagtaa aaaggacctg ttacctgcaa gcctaacaat	2280
atggttcccc ctgtttcagg ccaatacacc accagcagtt ctgcttgatc agctaaagac	2340
tctgactata actactctgt atgctgcattc acaaagtggc ccaatactaa aagtgaatgc	2400
atcggcccag ggtgcagcaa tgtctgtact tcccaaaaag tttgaagtca atgcgactgt	2460
agcacttgac gaatatacgaa aattagaatt tgacaaactt acagtctgtg aagtaaaaac	2520
agtttactta acaaccatga aaccatatgg gatggatca aagtttgc gctcgccaa	2580
accagttggc aaaaaaacac atgatctaatt cgcattatgc gatttatgg atctagaaaa	2640
gaacacacca gttacaatac cagcatttat caaatcagtt tctatcaagg agagtgaatc	2700

agccactgtt	gaagctgcaa	taagcagtga	agcagaccaa	gctctaacac	aagccaaaat	2760
tgcaccttat	gcgggactga	tcatgattat	gaccatgaac	aatcccaaag	gcatttcaa	2820
gaagcttgg	gctgggaccc	aagttatagt	agaacttagga	gcataatgtcc	aggctgaaag	2880
cataagtaaa	atatgcaaga	cttggagcca	tcaaggaaca	agatatgtgc	tgaagtccag	2940
ataacagcca	agcaacctga	ccaagaacta	ccaactctat	tctatagact	aaaaagtcgc	3000
cattttagtt	atataaaaat	caagttagaa	taagaattaa	atcaatcaag	aacgggacaa	3060
ataaaaatgt	cttggaaagt	ggtgatcatt	tttcattgc	taataacacc	tcaacacggt	3120
cttaaagaga	gctacctaga	agaatcatgt	agcactataa	ctgagggata	tcttagtgtt	3180
ctgaggacag	gttggtatac	caacgtttt	acatttaggg	tgggtatgt	agaaaaacctt	3240
acatgttctg	atggacctag	cctaataaaa	acagaattag	atctgaccaa	aagtgcacta	3300
agagagctca	aaacagtctc	tgctgaccaa	ttggcaagag	aggaacaaat	tgagaatccc	3360
agacaatcta	ggtttgttct	aggagcaata	gcactcggtg	ttgcaacagc	agctgcagtc	3420
acagcaggtg	ttgcaattgc	caaaaccatc	cggttgaga	gtgaagtcac	agcaattaag	3480
aatgcctca	aaacgaccaa	tgaagcagta	tctacattgg	ggaatggagt	tcgagtgtt	3540
gcaactgcag	tgagagagct	gaaagacttt	gtgagcaaga	attnaactcg	tgcaatcaac	3600
aaaaacaagt	gcgacattga	tgacctaaaa	atggccgtt	gcttcagtca	attcaacaga	3660
agtttctaa	atgttgcgc	gcaatttca	gacaatgtc	gaataacacc	agcaatatct	3720
ttggacttaa	tgacagatgc	tgaactagcc	agggccgtt	ctaacatgcc	gacatctgca	3780
ggacaaataa	aattgtgtt	ggagaaccgt	gcatgggtc	gaagaaaggg	gttcggaaatc	3840
ctgatagggg	tctacgggag	ctccgtaatt	tacatggtc	agctgccaat	ctttggcgtt	3900
atagacacgc	cttgctggat	agtaaaagca	gccccttctt	gttccggaaa	aaaggaaac	3960
tatgcttgcc	tcttaagaga	agaccaaggg	ttgtattgtc	agaatgcagg	gtcaactgtt	4020
tactacccaa	atgagaaaga	ctgtgaaaca	agaggagacc	atgtcttttgc	cgacacagca	4080
gcgggaatta	atgttgcgt	gcaatcaaag	gagtgcaca	tcaacatatc	cactacaaat	4140
tacccatgca	aagtcagcac	aggaagacat	cctatcagta	tgggtgcact	gtctcctctt	4200
ggggctctgg	ttgcttgcta	caaaggagta	agctgttcca	ttggcagcaa	cagagtaggg	4260
atcatcaagc	agctgaacaa	gggttgcctcc	tatataacca	accaagatgc	agacacagtg	4320
acaatagaca	acactgtata	tcaagctaagc	aaagttgagg	gtgaacagca	tgttataaaa	4380
ggcagaccag	tgtcaagcag	ctttgatcca	atcaagttc	ctgaagatca	attcaatgtt	4440
gcacttgacc	aagttttga	gaacattgaa	aacagccagg	ccttggtaga	tcaatcaaac	4500

agaatcctaa gcagtgcaga gaaaggaaat actggcttca tcattgtat aattctaatt 4560
gctgtccttg gctctagcat gatccttagtg agcatcttca ttataatcaa gaaaacaaag 4620
aaaccaacgg gagcacctcc agagctgagt ggtgtcacaa acaatggctt cataccacac 4680
agttagttaa ttaaaaataa aataaaattt gggacaaatc ataatgtctc gcaaggctcc 4740
atgcaaataat gaagtgcggg gcaaattgcaa cagaggaatg gagtgtaaat ttaaccacaa 4800
ttactggagt tggccagata gatacttatt aataagatca aactatctat taaatcagct 4860
tttaaggaac actgatagag ctgatggctt atcaataata tcagggcgcag gcagagaaga 4920
cagaacgcaa gattttgttc taggttccac caatgtggtt caaggttata ttgatgataa 4980
ccaaagcata acaaaagctg cagcctgcta cagtctacac aacataatca agcaactaca 5040
agaagttgaa gttaggcagg ctagagatag caaactatct gacagcaagc atgtggact 5100
ccataactta atcttatctt acatggagat gagcaaaact cccgcatttt taatcaacaa 5160
tctcaaaaaga ctgccgagag aaaaactgaa aaaatttagca aagctgataa ttgacttattc 5220
agcaggcgct gacaatgact cttcatatgc cctgcaagac agtgaagca ttaatcaagt 5280
gcagtgagca tggcctgtt ttcattacta tagaggttga tgaaatgata tggactcaaa 5340
aagaattaaa agaagctttg tccgatggga tagtgaagtc tcacaccaac attacaatt 5400
gttatttaga aaacatagaa attatataatg tcaaggctta cttaagtttag taaaaacaca 5460
tcagagtggg ataagtgaca atgataacat tagatgtcat taaaagtgtat gggtctcaa 5520
aaacatgtac tcacctcaaa aaaataatca aagaccatc tggtaaagtg cttattgcac 5580
ttaagttat attagcttta ctaacatttt tcacaataac aatcactata aattacataa 5640
aagtagaaaa caatctacaa atatgccagt caaaaactga atcagacaaa gaagactcac 5700
catcaaatac cacatccgtc acaaccaaga ccactctaga ccatgatata acacagtatt 5760
ttaaaagatt aattcaaagg tatacagatt ctgtaataaa caaggacaca tgctggaaaa 5820
taagcagaaa tcaatgcaca aatataacaa catataaatt tttatgctt aaacctgagg 5880
actcaaaaat caacagttgt gatagactga cagatctatg cagaaacaaa tcaaaatcag 5940
cagctgaagc atatcataca gtataatgcc attgcatata cacaattgag tggaaagtgc 6000
atcaccactc aatagattaa acccaatctt gaatgttaaa actagacttag gatccgtcta 6060
agactatcag ttcaatagtt tagttatattt aaaatatttg agaataaggta agtttctatg 6120
gcacttcata gcaataggta ataattaaca gcttaattat aattaaaaca ttatttaaaa 6180
tcgtaactat ttaatttaca aagtaaaaac aaaaatatgg gacaaggtagt tatggaggtg 6240
aaagtagaga acattcgagc aatagacatg ctcaaagcaa gagtgaaaaa tcgtgtggca 6300

cgttagcaaat gctttaaaaa tgcttcctta atcctcatag gaataactac actgagttata	6360
gctctcaata tctatctgat cataaaactac acaatacaaa aaacctcatc tgaatcagaa	6420
caccacacca gctcaccacc cacagaatcc aacaaggaag cttcaacaat ctccacagac	6480
aacccagaca tcaatccaaa ctcacagcat ccaactcaac agtccacaga aaaccccaaca	6540
ctcaaccccg cagcatcagt gagcccatca gaaacagaac cagcatcaac accagacaca	6600
acaaaaccgaa tgcctccgt agacaggtcc acagcacaac caagtgaaag cagaacaaag	6660
acaaaaccgaa cagtcacac aagaaacaac ccaagcacag cttccagttac acaatcccc	6720
ccacgggcaa caacgaaggc aatccgcaga gccaccactt tccgcattgag cagcacagga	6780
aaaagaccaa ccacaaacatc agtccagttcc gacagcagca ccacaacccaa aatcatgaa	6840
gaaacaggtt cagcgaaccc acaggcatct gtaaggcaca tgcaaaacta gcacaccaac	6900
aatataaaac caaatttagtt aacaaaaaaat acgagatagc tctaaagttaa aacatgttagg	6960
taccaacaat caagaaacca aaagacaact cacaatctcc ctAAAacagc aacgacacca	7020
tgtcagcttt gctcaaatct ctctggaga aacttttgc cacatactaa caacatcaca	7080
accatctcaa gaaaagaaac tgggcaaaac agcatccaag agacaaatag caatggatcc	7140
tcttaatgaa tccactgtta atgtctatct ccctgattcg taccttaaag gagtaatttc	7200
tttttagtcaa actaatgcaa ttgggtcatg tctcttaaaa agaccctact taaaaaatga	7260
caacactgca aaagttgcca tagagaatcc tggattttagg catgtgagac tcaaaaatgc	7320
agtcaattct aaaatgaaaa tatcagatta caaggttagta gagccagtaa acatgcaaca	7380
tgaaataatg aagaatgtac acagttgtga gtcacacta ttgaaacagt ttttaacaag	7440
gagtaaaaac attagcaactc tcaaattgaa tatgatatgt gattggctgc aattaaatgc	7500
tacatcagat gatacctcaa tcctaagttt catagatgta gaatttatac ctatgggt	7560
aagcaactgg ttttagtaatt ggtacaatct caataagtta attttggaaat tcagaagaga	7620
ggaagtaata agaaccgggtt caatctttag caggtcattt ggttttttttggaaat	7680
atcatcatat ggatgtatcg tcaagagcaa caaaagcaaa agagttagt tcttcacata	7740
caatcaactg ttaacatgga aagatgtgat gttaaatgatg tttatgcga atttttgtat	7800
atgggttaagc aatagtctga atgaaaaatca ggaagggtca gggttgagaa gtaatctgca	7860
aggtatgtta actaataaaac tatatgaaac tggtagattat atgctaaatct tatgttgc当地	7920
tgaaggtttc tcacttgcg aagagttcg aagttttattt atgagtgaga tccttaggat	7980
tactgaacat gctcaattca gtacttagatt tagaaataact ttattgaatg gattaacaga	8040
tcaattaaca aaataaaaaa ataaaaacag actcagagtt catagtaccg tattagaaaa	8100

taatgattat ccaatgtatg aagttgtact taaattatta ggagatactt tgagatgtat	8160
caaattatta atcaataaaa acttagagaa tgctgcagaa ttatactata tattcagaat	8220
ttttggtcat ccaatggtag atgaaagaga tgcaatggat gctgtcaa at taaacaatga	8280
aatcacaaaa atcctaaggt tggagagctt gacagaacta agagggcat tcataattaag	8340
gattatcaaa ggatttgtgg acaacaacaa aaggtggccc aaaattaaaa acttaaaagt	8400
gcttagcaaa agatggacta tgtacttcaa agctaaaaat taccgcagtc aactcgaatt	8460
aagtgaacaa gacttcttag agcttgctgc aatacaattt gaacaagagt tttctgttcc	8520
tgaaaaaacc aatcttgaga tggtattaaa tgacaaagcc atatcacctc ctaaaagatt	8580
aatatggct gtgtatccaa agaattactt acctgagacg ataaaaaaatc gatattttaga	8640
agaaactttc aatgcgagtg atagtc当地 aacaagaaga gtacttagt actattttaa	8700
agataataaa tttgatcaaa aggaacttaa aagttatgtt gttagacaag aatattttaa	8760
cgataaggag cacattgtct cattaactgg aaaagaaaga gaattaagtg tagtagaat	8820
gtttgctatg caaccaggaa aacagcgaca aatacaaata ttggcagaaa aattgttagc	8880
tgataacatt gtacctttct tcccgaaac cttacaaag tatggtgatc tagatcttca	8940
gagaataatg gaaatcaa at cagaacttcc ttctatcaaa accagaagaa atgatagttt	9000
taataattac attgcaagag catccatagt aacagattt agcaagttca accaaggcctt	9060
tagatatgaa actacagcga tctgtgcgga ttagcagac gaattacatg gaacacaaag	9120
cttattctgt tggttacatc ttatcggtcc tatgactaca atgatatgtg cctatagaca	9180
tgcaccacca gaaacaaaag gtgaatatga tatagataag atagaagagc aaagtggct	9240
atatagatat cacatggcg gtattgaagg atgggtcaaa aaactctgga caatggaaagc	9300
tatatctta ttggatgttg tatctgtaaa gacacgggtg caaatgacat ctttattttaa	9360
cggtgacaac caatcaatag atgtaagtaa accagtcaag ttatctgaag gtttagatga	9420
agtgaaggca gattatcgct tagcagtaaa aatgctaaaa gaaataagag atgcatacag	9480
aaatataggc cataaactta aagaagggaa aacatataata tcaagggatc ttcatgtttat	9540
aagcaagggtg attcaatctg aaggagtgtat gcattcctacc cctataaaaaa aggtcttgag	9600
agtaggacca tggataaaca caatattaga tgacattaaa actagtgttg agtcaatagg	9660
gagtctatgt caagaattag aattttagggg agaaagcata atagttatgc tgatattaag	9720
aaacttctgg ctgtataact tatacatgca tgaatcaaag caacatcctt tggcagggaa	9780
acagttattc aaacaactaa ataaaacatt aacatcagtg cagagatttt ttgaaattaa	9840
aaggaaaaat gaggttagtag atctatggat gaacatacca atgcaatttggaggagaa	9900

tccagtagtc ttctatagat ctttctatag aaggacccct gatTTTaa ctgaggcaat 9960
cagccatgt a gatattctgt taaaaatatac agctaacata aaaaatgaaa cgaaagtaag 10020
tttcttcaaa gccttactat caatagaaaa aatgaacgt gctacactga caacactaat 10080
gagagatcct caagctgtt gatcagaacg acaagcaaaa gtaacaagtg acatcaatag 10140
aacagcgtt accagtatct taagtcttc cccaaatcaa ctTTTcagtg atagtgcata 10200
acactacagc agaaatgaag aagaagtggg aatcattgca gaaaacataa cacctgttta 10260
tcctcatggg ctgagagttat tatatgaatc attgccctt cacaaagctg aaaaagttgt 10320
aaacatgata tcagggacaa aatctataac caacttatta cagagaacat ccgctattaa 10380
tggtaagat attgacaggg ctgtatctat gatgtggag aatctaggat tattatctag 10440
aatattgtca gtagttgtt atagtataga aattccaatc aaatctaatg gtaggctgat 10500
atgttgc当地 atctcttagga cttaagaga gacatcatgg aataatatgg aaatagttgg 10560
agtaacatct cctagcatca ctacatgtat ggatgtcata tatgcaacta gttctcattt 10620
gaaagggata attatagaaa agttcagcac tgacagaact acaaggggtc aaagagggtcc 10680
aaaaagccct tggtagggt cgagtactca agagaaaaaa ttagtacctg tttataacag 10740
acaaattctc tcaaaacaac aaagagaaca gctagaagca attggaaaaaa tgagatgggt 10800
gtataaaggg acaccaggct tgcgacgatt actcaacaag atctgtcttggagttttagg 10860
cattagctac aaatgtgtaa aacctttatt acctaggtt atgagtgtaa atttcttaca 10920
tagattatct gtcagtagta gacctatggg attcccagca tcagttccag cttatagaac 10980
aacaaattac catttcgaca ctatgcctat taatcaagca ctaagtgaga gatttggaa 11040
tgaagatatt aacttggctc tccaaaatgc aatcagctgt ggaatttagca taatgagtgt 11100
agtagaacaa ttaacaggta gaagccaaa acagtttagtt ttaatacccc aattagaaga 11160
aatagacatt atgccaccac cagtgttca agggaaattc aattataaat tagtagataa 11220
gataacttct gatcaacata tcttagtcc ggacaaaata gatatgttaa cactagggaa 11280
aatgctcatg cccactataa aaggtcagaa aacagatcag ttcttaataa agagagaaaa 11340
ttatTTccat ggaacaatc ttattgagtc ttatcagca gcatatggat gtcattgggt 11400
tggatatta acagaacaat gcatagaaaa taatatttc aagaaagact ggggtgacgg 11460
gtttatatac gatcatgctt ttatggactt caaaatattc ctatgtgtct taaaactaa 11520
actttatgt agttggggat ctcaaggaa aaacattaaa gatgaagata tagtagatga 11580
atcaatagat aaattgttaa ggattgacaa tacttttgg agaatgttca gcaaagttat 11640
gtttgaacca aaggttaaga aaaggataat gttatatgtat gtaaaattcc tatcactagt 11700

aggctacata gggtaaga actggttat agagcagtg agatcagctg aattgcatga 11760
aataccttgg attgtcaatg ccgaaggtga ttgggttag atcaagtcaa taaaaatcta 11820
tttgcactg atagaacaaa gcttatttt aagaataact gtttgaact atacagatat 11880
ggcacatgct ctcacacgat taatcagaaa gaagttaatg tgtgataatg cactgttaac 11940
cccaatttca tccccatgg ttaacttaac tcaagttatt gatcccacaa cacaattaga 12000
ttacttcccc aagataacat tcgaaaggct aaaaaattat gacacaagtt caaattatgc 12060
taaagggaaag ctaacaagaa attacatgat actattgcca tggcagcatg ttaatagata 12120
taactttgtc tttagttcta ctggatgtaa agttagtctg aaaacatgta ttggaaaact 12180
tatgaaagac ctaaattccta aagtttgcata cttattgga gaaggagcag gaaattggat 12240
ggccagaaca gcatgtgaat atcctgatataaatttgcata tatagaagtc tgaaagatga 12300
ccttgatcat cattatcctc tggaataccca gagagtgata ggtgaattaa gcagaatcat 12360
agatagtggtaaggactttt caatggaaac aacagacgca actcaaaaaa ctcattggaa 12420
tttgatacac agggtaagca aagatgctttt attaataact ttatgtgatg cagaatttac 12480
ggacagagat gatTTTTTta agatggtaat tctatggaga aaacatgtat tatcatgcag 12540
aatttgcact acttatggga cggacctcta ttattcgca aagtatcatg ctaaagactg 12600
caatgtaaaa ttaccttttt ttgtgagatc agttgctact ttcattatgc aggtagtaa 12660
gctgtcaggt tcagaatgct acatactctt aacacttaggc caccacaaca gtttacctt 12720
ccatggagaa atacaaaattt ctaagatgaa aatagcagtg tgtaatgatt tttatgctgc 12780
aaaaaaactc gacaataaat caattgaagc taattgtaaa tcactttgt cagggctaag 12840
aataacctata aataagaagg aactagatag acagagaaga ttattaacac tacaaagcaa 12900
tcattttctt gtagcaacag ttggcggtag caagatcata gagtctaagt ggttaacaaa 12960
caaagcaagt acaataattt gatgggtttaga acatattttt aattctccaa agggcgaatt 13020
aaattatgat tttttgtttaga cattggagaa cacttaccct aatatgatta aactaataga 13080
taacttaggg aatgcagaga ttaaaaaaact gatcaaagta acaggataca tgcttgtaag 13140
ttaaaaatga aaaatgatga agatgacaaa atagatgaca acttcataact attctaaatt 13200
aattatttga ttatgcaatt atatgatagt taattaaaat taaaaattaa aaatcaaaag 13260
ttaaaaattta aaacctatca ttaagtttat taaaaataag aaattataat tgaatgtata 13320
cggtttttt gccgt 13335

<210> 2
<211> 13280

<212> DNA

<213> human metapneumovirus

<400> 2

acgcgaaaaa aacgcgtata aattaaattc caaacaac gggacaaata aaaatgtctc	60
ttcaaggat tcacctaagt gatctgtcat ataaacatgc tatattaaaa gagtctcaat	120
acacaataaa aagagatgta ggcaccacaa ctgcagtgac accttcatca ttgcagcaag	180
agataacact tttgtgtgga gagattctt acactaaaca tactgattac aaatatgctg	240
cagagatagg gatacaatat atttgcacgg ctctaggatc agaaagagta caacagattt	300
taagaaattc aggcagtgaa gttcaggtgg ttctaaccaa gacatactct ttagggaaag	360
gtaaaaatag taaagggaa gagttgcaaa tgtagatat acatggagtg gaaaagagtt	420
ggtagaaaga aatagacaaa gaggcaagaa aaacaatggt gacttgcta aaggaatcat	480
caggtAACAT cccacaaaac cagaggcctt cagcaccaga cacaccaata attttattat	540
gtgttaggtgc tttaatattc actaaactag catcaacaat agaagttgga ctagagacta	600
cagttAGAAG agctaacaga gtgctaagtg atgcgctcaa aagataccct aggtagata	660
taccgaagat tgctagatct ttctatgaac tattttagca gaaagtgtat tacaggagtc	720
tattcattga gtatggaaa gctttaggct catcttcaac aggaagcaaa gcagaaagtt	780
tgTTGtaaa tatattttag caagcttatg gagccggtca aacaatgcta aggtgggtg	840
tcattGCCAG atcatctaAC aacataatgc taggacatgt gtctgtgcaa gctgaattga	900
agcaagttac agaggTTTat gatttggta gagaaatggg tcctgaatct gggCTTTAC	960
atctaAGACA aagtccaaAG gcaggACTGT tatcgTTGGC caattGCCCA gattttgcta	1020
gtgttGTTCT tggtaatgct tcaggtctag gtataatcgG aatgtacaga ggaagagtgc	1080
caaACACAGA gCTATTTCT gcagcagaaa gttatGCCAG aagCTTAAA gaaAGCAACA	1140
aaatcaACTT ctcctcatta gggctcacAG acgaAGAAA agaAGCTGCA gaACACTCT	1200
taAACATGAG tGATGACAAT caAGATGATT atGAGTAATT AAAAActgg gacaAGTCAA	1260
aatgtcATTc CCTGAAGGAA aAGATACTCT gttcatGGGT aatGAAGCAG caAAATAGC	1320
agaAGCTTC cAGAAATCAC tAAAAGATC aggtcacAAA agAACCCAGT ctattgtagg	1380
ggAAAAGTA aACACTATAT cAGAAACTCT agAGCTACCT accatcAGCA aACCTGCACG	1440
atcatctACA ctgctAGAGC caAAATTGGC atGGGcAGAC agcAGCAGAG ccACCAAAAC	1500
cacAGAAAAGTA caAAACAACCA aaACAACAGA tcctgttGAA gaAGAGGAAC tcaatgaaaa	1560
gaAGATATCA cttccAGTG atGGGAAGAC tcccGcAGAG AAAAATCAA aatctccaAC	1620
caatgtaaaa aAGAAAGTTT cttcacATC aaatGAACCA gggAAATATA ccAAACTAGA	1680

aaaagatgcc	ctagattgc	tctcagacaa	tgaggaagaa	gacgcagagt	cctcaatctt	1740
aaccttgaa	gagagagaca	catcatca	aagcattgag	gctagactag	aatcaataga	1800
agagaagcta	agcatgat	taggactgct	tcgtacactt	aacattgcaa	cagcaggacc	1860
aacggctgca	agagatggaa	tcagagatgc	aatgatttgt	ataagagaag	aactaatagc	1920
agaaataata	aaagaagcaa	aggaaaagc	agctgaaatg	atgaaagagg	aatgaatca	1980
aaggtcaaaa	ataggtaatg	gcagtgtaaa	actaaccgag	aaggcaaaag	aacttaataa	2040
aattgtgaa	gacgagagca	caagcggtga	atcagaagaa	gaagaagaac	caaaagaaac	2100
tcaggataac	aatcaaggag	aagatattt	ccagttatc	atgtagttt	ataaaaataa	2160
acaatggac	aagtcaagat	ggagtcctat	ctagtggaca	cttatcaagg	cattccctac	2220
acagctgctg	ttcaagttga	tctggtagaa	aaagacttac	taccagcaag	tttgacaata	2280
tggtttcctc	tattccaagc	caacacacca	ccagcggtt	tgctcgatca	gctaaagacc	2340
ttgacaataa	caactctgt	tgctgcatca	cagaatggtc	caatactcaa	ggtaaatgca	2400
tcagctcagg	gtgctgctat	gtctgtactt	cccaaaaaat	tcgaagttaa	tgcaactgtg	2460
gcacttgatg	aatacagcaa	acttgacttt	gacaagttaa	cggtttgcga	tgtaaaacaa	2520
gtttatttga	caaccatgaa	accatatggg	atggtgtcaa	aatttgtgag	ttcagccaaa	2580
tcagttggca	acaagacaca	tgatctaatt	gcactgtgt	acttcatgga	cctagagaaa	2640
aatatacctg	tgacaatacc	agcattcata	aagtcagttt	caatcaaaga	gagtgagtca	2700
gccactgtt	aagctgcaat	aagcagttag	gccgaccaag	cattaacaca	agccaaaatt	2760
gcaccctatg	caggactaat	catgatcatg	accatgaaca	atccaaaagg	tatattcaag	2820
aaacttaggag	ctggaacaca	agtgatagta	gagctagggg	catagttca	agccgagagc	2880
atcagcagga	tctgcaagag	ctggagtcac	caaggaacaa	gatatgtact	aaaatccaga	2940
taaaaataac	tgtcctaattc	aataattgct	tatataatct	taaaagatcaa	tgagcttatt	3000
attatagtt	tataaaaaaa	tttagaacta	ggaaggtatt	aatagaaagc	gggacaagta	3060
aaaatgtctt	ggaaagtgtat	gattatcatt	tcgttactca	taacacctca	gcacggacta	3120
aaggaaagtt	atttagaaga	atcatgtagt	actataactg	aaggatatct	cagtgttttta	3180
agaacaggtt	ggtacaccaa	tgtctttaca	ttagaagttg	gtgatgttga	aaatcttaca	3240
tgtactgatg	gacctagctt	aatcaaaaaca	gaacttgacc	taacaaaag	tgctctaaga	3300
gaactcaaaa	cagtttctgc	tgatcagtt	gcgagagaag	aacaaattga	aaatcccaga	3360
caatcaaggt	ttgtcctagg	tgcaatagct	cttggtgttgc	ccacagcagc	agcagtcaca	3420
gcaggcattg	cgatagccaa	aaccataagg	cttgagagtg	aagtgaatgc	aatcaaaggt	3480

cccaaattca tcaccataga ggcagatgt atgatatgga cacacaaaga attaaaagag	5340
acactgtctg atggatagc aaaatcacac accaatattt acagttgtta tttagaaaat	5400
atagaaataa tataatgttaa agcttactta agttagtaaa aaataaataag aatggataa	5460
atgacaatga aaacattaga tgtcataaaa agtgacggat cctcagaaac atgtaatcaa	5520
ctcaaaaaaa taataaaaaaa acactcaggt aaattgctta ttgcataaaa accgacattg	5580
gccttattga cgtccttcac agtaacaatt actgtcaact atacaaaagt agaaaataat	5640
ttgcaggcat gtcaattaaa aaatgaatca gacaaaaagg acacaaagct aaataccaca	5700
tcaacaacaa tcagacccat tcctgatcta aatgcagttac agtacctgaa aaggctgatt	5760
cagaaacaca ccaactctgt cacaaaagac agagataacct gttggagaat acacacgaat	5820
caatgcacaa atataaaaat atataagttc ttatgttttgc ggtctatgaa ttcaacaaat	5880
acagactgtg aagaaccaac agttctatgc gacaaaaagt caaaaaccat gacagaaaaa	5940
catagggaaag cagagtgtca cccgtccacat acaaccgagt ggtgggtgcca ttatctttaa	6000
gagaaaactc agtttcaac attaaaatca gaacaaatca tatctagatc tattaatata	6060
atagtcttagt tattttaaaaa ctctaaatat tgcgttagact tcacaacacc ctgcggcat	6120
atgcaataat caatggtcaa accactgttg caaaccacc tataatacaa tcactgagta	6180
atacaaaaaca agaaaatggg acaagtggcc atggaagcaa gagtggagaa cattcgggca	6240
atagacatgt tcaaagcaaa gatgaaaaac cgtataagaa gtagcaagtgc ccatagaaat	6300
gctacactga tccttattgg atcaacagca ccaagtatgg cactcaacac ccttttaatc	6360
attgatcatg caacatcaaa aaacatgacc aaagtggAAC actgtgtcaa catgccggcg	6420
gtagaaccaa gcaagaagac cccaaatgacc tctgcagcag acccaaacac caaaccacat	6480
ccacagcagg caacacagct gaccacagag gattcaacat ctctagcagc aaccctagag	6540
gaccatctac acacagggac aactccaaca ccagatgcaa cagtcgtccca gcaaaccaca	6600
gacgagcaca caacactgct gagatcaacc aacagacaga ccacccaaac aaccgcagag	6660
aaaaagccaa ccagagcaac aaccaaaaaa gaaaccacaa ctcgaaccac aagcacagct	6720
gcaacccaaa cactcaacac caccaaccaa actagcaatg gaagagaggc aaccacaaca	6780
tctgccagat ccagaaacaa tgccacaact caaagcagcg atcaaacaac ccaggcagca	6840
gacccaaagct cccaaatcaca acatacacag aaaagcacaa caacaacaca caacacagac	6900
acatcttctc caagtagtta acaaaaaaac tataaaataa ccatgaaaac caaaaaacta	6960
gaaaagttaa tttgaactca gaaaagaaca caaacactat atgaattgtt tgagcgtata	7020
tactaatgaa atagcatctg tttgtgcac aataatacca tcattatTTTtta agaaataaga	7080

agaagctaaa	attcaaggga	caaataacaa	tggatccgtt	ttgtaatcc	actgtcaatg	7140
tctatcttcc	tgattcatat	ctcaaaggag	taatatcttt	cagtgaaacc	aatgcaattg	7200
gctcatgcct	tttggaaaaga	ccctatctta	aaaaagataa	cactgctaaa	gttgctgtag	7260
aaaaccctgt	tgttgaacat	gtcagactta	gaaatgcagt	catgaccaaa	atgaagatat	7320
cagattataa	agtggttgaa	ccaattaata	tgcagcatga	aataatgaaa	aatatacaca	7380
gttgtgagct	cacattatta	aaacaattct	taacaagaag	taaaaacatt	agctccctaa	7440
aattaagtat	gatatgtgat	tggttacagt	taaaatccac	ctcagataac	acatcaattc	7500
ttaattttat	agatgtggag	tttatacccg	tttgggtgag	caattggttt	agtaactggt	7560
ataatctcaa	taaattaatc	ttagagtttta	gaagagagga	agtaataaga	actggttcaa	7620
tttatgcag	atcactaggc	aagttagttt	tcattgtatc	atcttatggg	tgtgtagtaa	7680
aaagcaacaa	aagtaaaaga	gtaagttttt	tcacatataa	ccaaactgtta	acatggaaag	7740
atgtgatgtt	aagtaggttc	aatgcaaact	tttgtatatg	ggtaagtaac	aacctgaaca	7800
aaaatcaaga	aggacttagga	tttagaaagta	atctacaagg	tatgttaact	aataaattat	7860
atgaaactgt	tgattatatg	ttaagtctat	gtagcaatga	agggttctca	ctagtgaaag	7920
attcgaagg	ctttattatg	agtgaaattc	ttaaaattac	tgagcatgct	caattcagta	7980
ctaggtttag	gaatacttta	ttaaatgggt	tgactgaaca	attatcaatg	ttgaaagcta	8040
aaaacagatc	tagagttctt	ggcactatat	tagaaaacaa	tgattacccc	atgtatgaag	8100
tagtacttaa	attattaggg	gacactttga	aaagtataaa	attattaatt	aacaagaatt	8160
tagaaaatgc	tgcagaatta	tattatatat	tcagaatttt	tggacaccct	atggtagatg	8220
agagggaaagc	aatggatgct	gttaaattaa	ataatgagat	tacaaaaatt	cttaaactgg	8280
agagcttaac	agaactaaga	ggagcattta	tactaagaat	tataaaaggg	ttttagata	8340
ataataaaag	atggcctaaa	attaagaatt	taaaagtgct	cagtaaaaga	tgggttatgt	8400
atttcaaagc	taaaagttac	cctagccaac	ttgagctaag	tgtacaagat	tttttagaac	8460
ttgctgcagt	acaattcgaa	caggaatttt	ctgtccctga	aaaaaccaat	cttgagatgg	8520
tattaaatga	taaagcaata	tctccaccaa	aaaagttaat	atggtcggta	tatccaaaaaa	8580
attatctacc	tgaatttata	aaaaatcaat	atttagaaga	ggtcttcaat	gcaagtgaca	8640
gtcaaagaac	gaggagagtc	ttagaatttt	acttaaaaga	ttgcaaattt	gatcaaaaag	8700
acctcaaacg	ttatgttaact	aaacaagagt	atctaaatga	caaagaccac	attgtctcat	8760
taactggaa	agaaagagaa	ttaagtgtag	gcaggatgtt	tgcaatgcaa	cctggcaaac	8820
aaagacaaat	acagatacta	gccgagaaac	tttttagctga	taatattgta	cccttttcc	8880

cagaaaactt aacaaagtat ggtgacttgg atctccaaag aattatggaa atgaaatcag	8940
aactttcttc cattaaaact aggaagaatg atagttacaa caattatatt gcaagagcct	9000
ccatagtaac agacctaagt aaattcaatc aagcctttag atatgaaacc acagctatct	9060
gcgagacgt agcagatgag ttacatggca cgcaaagctt atttgttgg ttacatctta	9120
ttgttccat gaccacaatg atatgtcat acagacatgc accaccagaa acaaaggggg	9180
agtatgat agacaaaata gaagagcaa gtgggctata cagataccat atgggagggg	9240
ttgaagggtg gtgtcagaag ttatggacaa tggaggcgat atccttgtta gatgttagt	9300
ctgttaagac tcgttgcag atgacctctc tattaaacgg agacaatcaa tcaatagatg	9360
tcaagtaacc agtaaaatttgc tctgaaggta tagatgaagt aaaagcagat tatacgat	9420
caattaaaat gcttaaagag ataagagatg cctataaaaaa cattggccat aaactcaaag	9480
aaggtaaac atatataatca agagatcttc aatttataag taaggtgatt caatctgagg	9540
gggtcatgca tcctacccccataaaaaaaga tattaagggt aggtccctgg ataaatacaa	9600
tactagatga cattaaaact agtgcagaat caatagggag tctgtgtcaa gaactagagt	9660
tcagaggaga aagtatacta gttagcttga tattaaggaa tttctggctg tataacttat	9720
acatgcatga gtcaaaacag catccgttag ctggaaaaca actgtttaaa caattgaaca	9780
aaacactaac atctgtgcaa agatttttg agctgaagaa agaaaatgat gtggttgacc	9840
tatggatgaa tataccaatg cagtttggag ggggagaccc agtagtttt tacagatctt	9900
tttacagaag gactcctgat ttcttgactg aagcaatcag ccatgtggat ttactgtttaa	9960
aagtttcaaa caatattaaa aatgagacta agatacgatt cttaaagcc ttattatcta	10020
tagaaaagaa tgaacgtgct acattaacaa cactaatgag agaccccccag gcggtaggat	10080
cgaaaaagaca agctaaggta acaagtgata taaatagaac agcagttact agcataactga	10140
gtctatctcc gaatcagcta ttttgtata gtgctataca ctatagcaga aatgaagaag	10200
aagtagggat cattgcagac aacataacac ctgtttatcc tcacggattg agagtgtct	10260
atgaatcact acctttcat aaggctgaaa aggttgtcaa tatgatatca ggtacaaagt	10320
ctataactaa cctattgcag agaacatctg ctatcaatgg tgaagatatt gatagagcag	10380
tgtctatgtat gtttagagaac tttagggtgt tatctaggat attgtcagta ataattaata	10440
gtatagaaat accaattaag tccaatggca gattgatatg ctgtcaaatt tctaagactt	10500
tgagagaaaa atcatggaaac aatatggaaa tagtaggagt gacatctcca agtattgtaa	10560
catgtatgga ttttgttat gcgactagtt ctcattaaa agaataatt attgaaaaat	10620
tcagtaactga caagaccaca agaggtcaga ggggacccaa aagcccttgg gtaggatcaa	10680

gcactcaaga gaaaaaatta gttcctgttt ataacagaca aattcttca aaacaacaaa 10740
aagagcaact ggaagcaata ggaaaaatga ggtgggtgta taaaggaact ccagggctaa 10800
gaagattgct caataagatt tgcataggaa gtttaggtat tagctataaa tgtgtaaaac 10860
ctcttattacc aagattttagt agtgtaaact tcttacatag gttatctgtt agtagcagac 10920
ccatggaatt cccagcttct gttccagctt ataggacaac aaattaccac tttgacacta 10980
gtccaatcaa ccaagcatta agtgagaggt tcgggaacga agacattaat ctatgttcc 11040
aaaatgcaat cagctgcgga attagtataa tgagtgttgt agaacagtta actggtagaa 11100
gcccaaaaca attagtctta atccccat tagaagagat agatattatg cccctccctg 11160
tatttcaagg aaaattcaat tataaactag ttgataaaaat aacctccgat caacacatct 11220
tcagtcctga caaaatagac atattaacac taggaaagat gcttatgcct actataaaag 11280
gtcaaaaaac tgatcagttc ttaaataaga gagaaaacta tttccatgga aataattaa 11340
ttgaatctt atctgcagca cttgcattgc attgggtgtgg aatattaaca gaacagtgt 11400
tagaaaacaa tatctttagg aaagactggg gtgatggggtt catatcagat catgccttca 11460
tggatttcaa gatatttcta tgtgtattt aaaccaaact tttatgttgt tggggatccc 11520
aaggaaaaaa tgtaaaagat gaagatataa tagatgaatc cattgacaaa ttattaagaa 11580
ttgacaacac tttttggaga atgttcagca aagtcatgtt tgaatcaag gtcaaaaaaaaa 11640
gaataatgtt atatgatgta aaattcctat cattagtagg ttatataggg tttaaaaact 11700
ggtttataga gcagtttaga gtagttagaaat tgcatgaagt accctggatt gtcaatgtg 11760
aaggggagct agttgaaatt aaaccaatca aaatttattt gcagttataa gaacaaagtc 11820
tatctttaag aataactgtt ttgaattata cagacatggc acatgctttt acacgattaa 11880
tttaggaagaa attgatgtgt gataatgcac tctttatcc aagttcatca ccaatgttta 11940
gtcttaactca agtttattgtat cctacaacac agcttagacta ttttcctaag gtaatatttg 12000
aaaggtaaa aagttatgac accagttcag actacaacaa agggaaagtta acaagaaatt 12060
acatgacatt attaccatgg cagcacgtaa acaggtataa ttttgcctt agttcaacag 12120
gatgtaaaat cagcttgaag acatgcattcg ggaaattgtat aaaggactta aacccttaagg 12180
ttctttactt tattggagaa ggagcaggta actggatggc aagaacagca tgtgagttac 12240
ctgacataaa atttgtatattt aggagttaa aggtatgtt tgatcaccat taccctttag 12300
aatatcaaag ggttaataggt gatttaataa gagtaataga tggtggtgaa ggattatcaa 12360
tggagaccac agatgcaact caaaagactc attgggactt gatacacaga ataagtaaag 12420
atgctttattt gataacattt gttgtatgcag aattcaaaaaa cagagatgtat ttctttaaaa 12480

tggttaattct ttggagaaaa catgtattat catgtagaat ctgtacagct tatggaacag	12540
atctttactt atttgcaaag tatcatgcga cggactgcaa tataaagtta ccatttttg	12600
taaggtctgt agctactttt attatgcaag gaagcaaatt gtcaggatca gaatgttaca	12660
tacttttaac attaggtcat cacaataatc tgccatgtca cggagaaata caaaatcca	12720
aaatgagaat agcagtgtgt aatgattcc atgcctcaaa aaaactagac aacaaatcaa	12780
ttgaagcaaa ctgcaaatct cttctatcag gattaagaat accaataaac aaaaaagagt	12840
taaatagaca aaagaaaactg ttaacactac aaagcaatca ttcttcata gcaacagttg	12900
gcggaagtaa gattatagaa tccaaatggt taaagaataa agcaagtaca ataattgatt	12960
ggtagagca tatcttgaat tctccaagag gtgaattaaa ctatgatttc tttgaagcat	13020
tagagaacac atatccaat atgatcaagc ttatagataa cctggaaat gcagagataa	13080
aaaaactaat caaagttacc ggttatatgc ttgtgagtga gaagtaataa taataataat	13140
aatcaaccat aatctcacac aactgagaaa atgatcatct aacagttaa ttgaccattt	13200
gttaattaaa aattataaaat tagtaactaa ttgataaaaa ataagaaatt gaaattgaat	13260
gtatacggtt ttttgccgt	13280

<210> 3
 <211> 14083
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> HMPV strain 83 with GFP inserted prior to N gene.

<400> 3	
acgcgaaaaa aacgcgtata aattaagtta caaaaaaaca tgggacaagt gaaaatggtg	60
agcaagggcg aggagctgtt caccgggtg gtgcccattc tggtcgagct ggacggcgac	120
gtaaacggcc acaagttcag cgtgtccggc gagggcgagg gcgatgccac ctacggcaag	180
ctgaccctga agttcatctg caccacggc aagctgccc tgcctggcc caccctcgta	240
accaccctga cctacggcgt gcagtgcattc agccgctacc ccgaccacat gaagcagcac	300
gacttcttca agtccgccc gcccgaaggc tacgtccagg agcgcaccat cttcttcaag	360
gacgacggca actacaagac cgcgcggag gtgaagttcg agggcgacac cctggtaac	420
cgcattcgagc tgaagggcat cgacttcaag gaggacggca acatcctggg gcacaagctg	480
gagtacaact acaacagcca caacgtctat atcatggccg acaagcagaa gaacggcatc	540
aaggtgaact tcaagatccg ccacaacatc gaggacggca gcgtgcagct cgccgaccac	600
taccagcaga acaccccat cggcgacggc cccgtgctgc tgcccgacaa ccactacctg	660

agcaccagg	ccgcctgag	caaagacccc	aacgagaagc	gcgatcacat	ggcctgctg	720
gagttcgtga	ccgcccgg	gatcactctc	ggcatggacg	agctgtacaa	gtaaagttaat	780
taaaaaagtg	ggacaagtga	aatgtctct	tcaaggatt	cacctgagtg	atctatcata	840
caagcatgct	atattaaaag	agtctcagta	tacaataaag	agagatgtag	gcacaacaac	900
agcagtgaca	ccctcatcat	tgcaacaaga	aataacacta	ttgtgtggag	aaattctata	960
tgctaagcat	gctgattaca	aatatgctgc	agaaaatagga	atacaatata	ttagcacagc	1020
tctaggatca	gagagagtac	agcagattct	aagaaactca	ggcagtgaag	tccaaagtgg	1080
tttaaccaga	acgtactcct	tggggaaagt	taaaaacaac	aaaggagaag	atttacagat	1140
tttagacata	cacggagtag	agaaaagctg	ggtggaagag	atagacaaag	aagcaagaaa	1200
aacaatggca	actttgctta	aagaatcatc	aggcaatatt	ccacaaaatc	agaggccttc	1260
agcaccagac	acacctataa	tcttattatg	tgttagtgcc	ttaatattta	ccaaactagc	1320
atcaactata	gaagtggat	tagagaccac	agtcagaaga	gctaaccgtg	tactaagtga	1380
tgcactcaaa	agatacccta	ggatggacat	acccaaaatc	gctagatctt	tctatgattt	1440
atttgaacaa	aaagtgtatt	acagaagttt	gttcattgag	tatggcaaaag	cattaggctc	1500
atcctctaca	ggcagcaaag	cagaaagttt	attcgtaat	atattcatgc	aagcttacgg	1560
tgctggtaa	acaatgctga	ggtggggagt	cattgccagg	tcatctaa	atataatgtt	1620
aggacatgta	tctgtccaag	ctgagttaaa	acaagtccaca	gaagtctatg	acctggtgcg	1680
agaaaatggc	cctgaatctg	ggctcctaca	ttaaggcaa	agccaaaag	ctggactgtt	1740
atcaactagcc	aattgtccc	actttgcaag	tgttgttctc	ggcaatgcct	caggcttagg	1800
cataataggt	atgtatcgcg	ggagagtgcc	aaacacagaa	ctatttcag	cagcagaaag	1860
ctatgccaag	agtttgaaag	aaagcaataa	aattaacttt	tcttcattag	gactcacaga	1920
tgaagaaaaa	gaggctgcag	aacactttct	aatgtgagt	gacgacagtc	aaaatgatta	1980
tgagtaatta	aaaaagtgg	acaagtccaa	atgtcattcc	ctgaaggaaa	agatattctt	2040
ttcatggta	atgaagcggc	aaaattggca	gaagcttcc	aaaaatcatt	aagaaaacct	2100
agtcataaaa	gatctcaatc	tattatagga	aaaaaagtga	acactgtatc	tgaaacattg	2160
gaattaccta	ctatcagtag	acctacaaa	ccgaccatat	tgtcagagcc	gaagtttagca	2220
tggacagaca	aaggtggggc	aatcaaaaact	gaagcaaagc	aaacaatcaa	agttatggat	2280
cctattgaag	aagaagagtt	tactgagaaa	agggtgctgc	cctccagtga	tggaaaact	2340
cctgcagaaa	agaagttgaa	accatcaacc	aatactaaaa	agaaggtctc	atttacacca	2400
aatgaaccag	gaaaatacac	aaagttggag	aaagatgctc	tagacttgct	ttcagacaat	2460

gaagaagaag atgcagaatc ctcaatctta acttcgaag aaagagatac ttcatcatta	2520
agcattgaag ccagactaga atcgatttag gagaattaa gcatgatatt agggctatta	2580
agaacactca acattgctac agcaggaccc acagcagcaa gagatggat cagagatgca	2640
atgattggca taagggagga actaatagca gacataataa aagaagccaa gggaaaagca	2700
gcagaaatga tggagaaga aatgaaccag cggacaaaa taggaaacgg tagtgtaaaa	2760
ttaactgaaa aggcaaagga gctcaacaaa attgttgaag acgagagcac aagtggtgaa	2820
tccgaagaag aagaagaact aaaagacaca cagaaaaata atcaagaaga tgacattac	2880
cagttaaatta tgttagttaa taaaaataaa aatgggaca agtaaaaatg gagtcctatc	2940
tggtagacac ctatcaaggc atcccttaca cagcagctgt tcaagttgat ctagtagaaa	3000
aggacctgtt acctgcaagc ctaacaatat gttccccct gttcaggcc aatacaccac	3060
cagcagttct gcttgatcag ctaaagactc tgactataac tactctgtat gctgcatcac	3120
aaagtggtcc aatactaaaaa gtgaatgcat cggcccaggg tgcagcaatg tctgtacttc	3180
ccaaaaagtt tgaagtcaat gcgactgttag cacttgacga atatacgaaa tttagaatttg	3240
acaaaacttac agtctgtgaa gtaaaaacag tttacttaac aaccatgaaa ccatatggg	3300
tggtatcaaa gtttgtgagc tcggccaaac cagttggcaa aaaaacacat gatctaattcg	3360
cattatgcga ttttatggat ctagaaaaga acacaccagt tacaatacca gcatttatca	3420
aatcagtttc tatcaaggag agtgaatcag ccactgttga agctgcaata agcagtgaag	3480
cagaccaagc tctaacaacaa gccaaaattt caccttatgc gggactgatc atgattatga	3540
ccatgaacaa tcccaaaggc atattcaaga agcttggagc tgggacccaa gttatagtag	3600
aactaggagc atatgtccag gctgaaagca taagtaaaat atgcaagact tggagccatc	3660
aaggaacaag atatgtctg aagtccagat aacagccaa cAACCTGACC aagaactacc	3720
aactctattt tataactaa aaagtcgcca ttttagttt ataaaaatca agttagaata	3780
agaatgctag caatcaagaa cgggacaaaat aaaaatgtct tggaaagtgg tgatcatttt	3840
ttcattgcta ataacaccc aacacggctt taaagagagc tacctagaag aatcatgttag	3900
cactataact gagggatattc ttagtggctt gaggacaggt tggatatacca acgtttttac	3960
attagaggtg ggtgatgttag aaaaccttac atgttctgat ggacctagcc taataaaaac	4020
agaatttagat ctgaccaaaa gtgcactaag agagctcaa acagtctctg ctgaccaatt	4080
ggcaagagag gaacaaattt agaatcccag acaatctagg tttgttctag gagcaatagc	4140
actcggtgtt gcaacagcag ctgcagtcac agcaggtgtt gcaattgcca aaaccatccg	4200
gcttgagagt gaagtcacag caattaagaa tgccctcaaa acgaccaatg aagcagtatc	4260

tacattgggg aatggagttc gagtggtggc aactgcagtg agagagctga aagactttgt	4320
gagcaagaat ttaactcgta caatcaacaa aaacaagtgc gacattgatg acctaaaaat	4380
ggccgttagc ttcaagtcaat tcaacagaag gtttctaaat gttgtgcggc aattttcaga	4440
caatgctgga ataacaccag caatatctt ggacttaatg acagatgctg aactagccag	4500
ggccgtttct aacatgccga catctgcagg acaaataaaa ttgatgttgg agaaccgtgc	4560
gatggtgcga agaaagggt tcggaatcct gataggggtc tacggagct ccgtaattta	4620
catggtgcag ctgccaatct ttggcgttat agacacgcct tgctggatag taaaagcagc	4680
cccttcttgt tccggaaaaa agggaaacta tgctgcctc ttaagagaag accaagggtg	4740
gtattgtcag aatgcagggt caactgttta ctacccaaat gagaaagact gtgaaacaag	4800
aggagaccat gtctttgcg acacagcagc gggaaattaat gttgctgagc aatcaaagga	4860
gtgcaacatc aacatatcca ctacaaatta cccatgcaaa gtcagcacag gaagacatcc	4920
tatcagtatg gttgcactgt ctccctttgg ggctctggg gcttgctaca aaggagtaag	4980
ctgttccatt ggcagcaaca gagtagggat catcaagcag ctgaacaagg gttgctccct	5040
tataaccaac caagatgcag acacagtgc acatgtatc agctaagcaa	5100
agttgagggtaa gaacagcatg ttataaaagg cagaccagtgc tcaagcagct ttgatccat	5160
caagtttccctt gaagatcaat tcaatgtgc acttgaccaa gttttgaga acattgaaaa	5220
cagccaggcc ttggtagatc aatcaaacag aatcctaagc agtgcagaga aagggaaatac	5280
tggcttcatc attgtataa ttcttaattgc tgccttggc tctagcatga tcctagtgag	5340
catcttcatt ataatcaaga aaacaaagaa accaacggga gcaccccccag agctgagtgg	5400
tgtcacaaac aatggcttca taccacacag ttagttaatt aaaaataaaa taaaatttgg	5460
gacaaatcat aatgtctcgc aaggctccat gcaaatatga agtgcggggc aaatgcaaca	5520
gaggaagtga gtgtaagttt aaccacaatt actggagttg gccagataga tacttattaa	5580
taagatcaaa ctatcttta aatcagctt taaggaacac tgatagagct gatggcttat	5640
caataatatc aggcgcaggc agagaagaca gaacgcaaga ttttgttcta ggttccacca	5700
atgtggttca aggttatatt gatgataacc aaagcataac aaaagctgca gcctgctaca	5760
gtctacacaa cataatcaag caactacaag aagttgaagt taggcaggct agagatagca	5820
aactatctga cagcaagcat gtggcactcc ataacttaat cttatcttac atggagatga	5880
gcaaaactcc cgcatcttta atcaacaatc tcaaaagact gccgagagaa aaactgaaaa	5940
aatttagcaaa gctgataatt gacttatcag caggcgctga caatgactct tcataatgccc	6000
tgcaagacag tgaaagcatt aatcaagtgc agtgcaggatg gtcctgtttt cattactata	6060

gagggtgatg aaatgatatg gactcaaaaa gaattaaaag aagcttgtc cgatggata	6120
gtgaagtctc acaccaacat ttacaattgt tatttagaaa acatagaaat tatatatgtc	6180
aaggcttact taagtttagta aaaacacatc agagtggat aagtgacaat gataacatta	6240
gatgtcatta aaagtgtatgg gtcttcaaaa acatgtactc acctcaaaaa aataatcaaa	6300
gaccattctg gtaaaagtgtct tattgcactt aagttaatat tagcttact aacattttc	6360
acaataacaa tcactataaa ttacataaaa gtagaaaaca atctacaaat atgccagtca	6420
aaaactgaat cagacaaaga agactcacca tcaaataccca catccgtcac aaccaagacc	6480
actctagacc atgatataac acagtatttt aaaagattaa ttcaaaggta tacagattct	6540
gtaataaaca aggacacatg ctggaaaata agcagaaaatc aatgcacaaa tataacaaca	6600
tataaatttt tatgcttaa acctgaggac tcaaaaatca acagttgtga tagactgaca	6660
gatctatgca gaaacaaatc aaaatcagca gctgaagcat atcatacagt agaatgccat	6720
tgcataataca caattgagtg gaagtgtat caccactcaa tagattaaac ccaatcttga	6780
atgttaaaac tagacttagga tccgtctaag actatcagtt caatagtttta gttattttaa	6840
aatatttgag aataggtaag tttctatggc acttcatagc aataggtaat aattaacagc	6900
ttaattataa ttaaaacatt attaaaatc gtaactattt aatttacaaa gtaaaaacaa	6960
aaatatggga caagtagtta tggaggtgaa agtagagaac attcgagcaa tagacatgct	7020
caaagcaaga gtgaaaaatc gtgtggcacg tagcaaatgc tttaaaaatg cttctttaat	7080
cctcatagga ataactacac tgagtatagc tctcaatatac tatctgatca taaactacac	7140
aatacaaaaa acctcatctg aatcagaaca ccacaccagc tcaccaccca cagaatccaa	7200
caaggaagct tcaacaatct ccacagacaa cccagacatc aatccaaact cacagcatcc	7260
aactcaacag tccacagaaa accccacact caaccccgca gcatcagtga gcccatcaga	7320
aacagaacca gcatcaacac cagacacaac aaaccgcctg tcctccgtag acaggtccac	7380
agcacaacca agtcaaagca gaacaaagac aaaaccgaca gtccacacaa gaaacaaccc	7440
aagcacagct tccagtacac aatccccacc acgggcaaca acgaaggcaa tccgcagagc	7500
caccacttcc cgcatgagca gcacaggaaa aagaccaacc acaacatcag tccagtccga	7560
cagcagcacc acaacccaaa atcatgaaga aacaggttca gcgaaacccac aggcacatctgt	7620
aagcacaatg caaaactagc acaccaacaa tataaaacca aatttagttaa caaaaaatac	7680
gagatagctc taaagtaaaa cattaggtta ccaacaatca agaaacccaaa agacaactca	7740
caatctccct aaaacagcaa cgacaccatg tcagtttgc tcaaatctct ctgggagaaa	7800
cttttgcacca catactaaca acatcacacaa catctcaaga aaagaaaactg ggcaaaacag	7860

catccaagag acaaatacgca atggatcctc ttaatgaatc cactgttaat gtctatctcc	7920
ctgattcgta ccttaaagga gtaatttctt ttagtgaac taatgcaatt ggtcatgtc	7980
tcttaaaaag accctactta aaaaatgaca acactgcaaa agttgccata gagaatcctg	8040
ttatttagca tgtgagactc aaaaatgcag tcaattctaa aatgaaaata tcagattaca	8100
aggttagtaga gccagtaaac atgcaacatg aaataatgaa gaatgtacac agttgtgagc	8160
tcacactatt gaaacagttt ttaacaagga gtaaaaacat tagcaactctc aaattgaata	8220
tgatatgtga ttggctgcaa ttaaagtcta catcagatga tacctcaatc ctaagttca	8280
tagatgtaga atttatacct agttggtaa gcaactggtt tagtaattgg tacaatctca	8340
ataagttaat tttggaaattc agaagagagg aagtaataag aaccggttca atcttatgca	8400
ggtcattggg taaatttagtt tttattgtat catcatatgg atgtatcgac aagagcaaca	8460
aaagcaaaag agtgagcttc ttcacataca atcaactgtt aacatggaaa gatgtgatgt	8520
taagtagatt taatgcgaat ttttgtatat gggtaagcaa tagtctgaat gaaaatcagg	8580
aagggctagg gttgagaagt aatctgcaag gtatgttaac taataaacta tatgaaactg	8640
tagattatat gctaagctta tggtgcaatg aaggttctc acttgtgaaa gagttcgaag	8700
gttttattat gagtgagatc cttaggatta ctgaacatgc tcaattcagt actagattta	8760
gaaatacttt attgaatgga ttaacagatc aattaacaaa attaaaaat aaaaacagac	8820
tcagagttca tagtaccgta ttagaaaata atgattatcc aatgtatgaa gttgtactta	8880
aattattagg agatacttg agatgtatca aattattaat caataaaaac ttagagaatg	8940
ctgcagaatt atactatata ttcagaattt ttggcatcc aatggtagat gaaagagatg	9000
caatggatgc tgtcaaatta aacaatgaaa tcacaaaaat cctaagggtt gagagcttga	9060
cagaactaag agggcattc atattaagga ttatcaaagg atttgtggac aacaacaaaa	9120
ggtggcccaa aattaaaaac ttaaaaagtgc ttagaaaaag atggactatg tacttcaaag	9180
ctaaaaatta ccccagtcaa ctcgaattaa gtgaacaaga ctttctagag cttgctgcaa	9240
tacaatttga acaagagttt tctgttcctg aaaaaaccaa tctttagatg gtattaaatg	9300
acaaagccat atcacctcct aaaagattaa tatggctgt gtatccaaag aattacttac	9360
ctgagacgt aaaaaatcga tatttagaag aaactttcaa tgcgagtgt agtctcaaaa	9420
caagaagagt actagagttac tattttaaaag ataataaatt tgatcaaaag gaactttaaa	9480
gttatgtatg tagacaagaa tattttaaacg ataaggagca cattgtctca ttaactggaa	9540
aagaaagaga attaagtgtt ggttagatgt ttgctatgca accagggaaa cagcgacaaa	9600
tacaaatatt ggcagaaaaaa ttgttagctg ataacattgt acctttcttc ccggaaacct	9660

taacaaagta tggtgatcta gatcttcaga gaataatgga aatcaaatca gaactttctt	9720
ctatcaaaac cagaagaaat gatagttata ataattacat tgcaagagca tccatagtaa	9780
cagatttgag caagttcaac caagcctta gatatgaaac tacagcgatc tgtgcggatg	9840
tagcagacga attacatgga acacaaaagct tattctgtt gttacatctt atcgttccta	9900
tgactacaat gatatgtgcc tatagacatg caccaccaga aacaaaaggt gaatatgata	9960
tagataagat agaagagcaa agtggcttat atagatatca catgggcggt attgaaggat	10020
ggtgtcaaaa actctggaca atggaagcta tatctttatt ggatgttgta tctgtaaaga	10080
cacggtgtca aatgacatct ttattaaacg gtgacaacca atcaatagat gtaagtaaac	10140
cagtcaagtt atctgaaggt ttagatgaag tgaaggcaga ttatcgctta gcagtaaaaa	10200
tgctaaaaga aataagagat gcatacagaa atataggca taaactaaa gaagggaaa	10260
catatatatc aagggatctt cagttataa gcaaggtgat tcaatctgaa ggagtgtatgc	10320
atcctacccc tataaaaaag gtcttgagag taaggaccatg gataaacaca atattagatg	10380
acattaaaac tagtgctgag tcaataggaa gtctatgtca agaatttagaa tttagggag	10440
aaagcataat agtttagtctg atattaagaa acttctggct gtataactta tacatgc	10500
aatcaaagca acatccttg gcagggaaac agttattcaa acaactaaat aaaacattaa	10560
catcagtgcg gagattttt gaaattaaaa gggaaaatga ggttagtagat ctatggatga	10620
acataccaaat gcaatttggaa ggaggagatc cagtagtctt ctatagatct ttctatagaa	10680
ggaccctgaa ttttttaact gaggcaatca gccatgtaga tattctgtt aaaaatatcag	10740
ctaacataaa aaatgaaacg aaagtaagtt tcttcaaagc cttactatca atagaaaaaa	10800
atgaacgtgc tacactgaca acactaatga gagatcctca agctgttgaa tcagaacgc	10860
aagcaaaaatg aacaagtgc acataatgaa cagcagttac cagtagtctt agtctttccc	10920
caaataact tttcagtgat agtgctatac actacagcag aaatgaagaa gaagtggaa	10980
tcattgcaga aaacataaca cctgtttatc ctcatggct gagagtatta tatgaatcat	11040
tgcctttca caaagctgaa aaagttgtaa acatgatatc agggacaaaa tctataacca	11100
acttattaca gagaacatcc gctattaatg gtgaagatat tgacaggct gtatctatga	11160
tgttggagaa tctaggatta ttatctagaa tattgtcagt agttgttgat agtataaaaa	11220
ttccaaatcaa atctaattgggt aggctgatat gttgtcaat ctctaggact ttaagagaga	11280
catcatggaa taatatggaa atagttggag taacatctcc tagcatcact acatgtatgg	11340
atgtcatata tgcaactagt tctcatttga aaggataat tatagaaaag ttcagcactg	11400
acagaactac aaggggtcaa agaggtccaa aaagcccttg ggtagggtcg agtactcaag	11460

agaaaaaaatt agtacaccttataacagac aaattctctc aaaacaacaa agagaacagc 11520
tagaagcaat tgaaaaatg agatgggtgt ataaaggac accaggcttgcgacgattac 11580
tcaacaagat ctgtcttggg agtttaggca ttagctacaa atgtgtaaaa cctttattac 11640
ctaggttat gagtgtaaat ttcttacata gattatctgt cagtagtaga cctatggaat 11700
tcccagcatc agttccagct tatagaacaa caaattacca tttcgacact agtcctatta 11760
atcaaggact aagttagaga tttggaaatg aagatattaa cttggcttc caaaatgcaa 11820
tcagctgtgg aatttagcata atgagtgtag tagaacaatt aacaggtaga agcccaaaac 11880
agtttagttt aataccccaa ttagaagaaa tagacattat gccaccacca gtgttcaag 11940
ggaaattcaa ttataaatttta gtagataaga taacttctga tcaacatatc tttagtcgg 12000
acaaaataga tatgttaaca cttaggaaaaa tgctcatgcc cactataaaa ggtcagaaaa 12060
cagatcagtt cttaaataag agagaaaatt atttccatgg aaacaatctt attgagttt 12120
tatcagcagc attagcatgt cattgggtgtggatattaac agaacaatgc atagaaaata 12180
atatttcaa gaaagactgg ggtgacgggt ttatatcaga tcatgctttt atggacttca 12240
aaatattcct atgtgtcttt aaaactaaac ttttatgttag ttggggatct caagggaaaa 12300
acattaaaga tgaagatata gtagatgaat caatagataa attgttaagg attgacaata 12360
ctttttggag aatgttcagc aaagttatgt ttgaacccaa ggttaagaaa aggataatgt 12420
tatatgatgt aaaattccta tcactagtag gctacatagg gttttaagaac tggtttata 12480
agcagtttag atcagctgaa ttgcattgaaa taccttggat tgtcaatgcc gaaggtgatt 12540
tggtttagat caagtcaatt aaaatctatt tgcaactgtt agaacaagc ttatttttaa 12600
gaataactgt tttgaactat acagatatgg cacatgctt cacacgatta atcagaaaaga 12660
agttaatgtg tgataatgca ctgttaaccc caatttcattc cccaatggtt aacttaactc 12720
aagttattga tcccacaaca caatttagatt acttcccaa gataacattc gaaaggctaa 12780
aaaattatga cacaagttca aattatgcta aagggaaatc aacaagaaat tacatgatc 12840
tattgcattg gcagcatgtt aatagatata actttgtctt tagttctact ggatgtaaag 12900
ttagtctgaa aacatgtatt ggaaaactta tgaaagacctt aaatcctaaa gttttgtact 12960
ttattggaga aggagcagga aattggatgg ccagaacagc atgtgaatat cctgatattt 13020
aatttgata tagaagtctg aaagatgacc ttgatcatca ttatcctctg gaataccaga 13080
gagtgatagg tgaattaagc agaatcatag atagtggtga aggactttca atggaaacaa 13140
cagacgcaac tcaaaaaact cattgggatt tgatacacag ggttaagcaa gatgctttat 13200
taataacttt atgtgatgca gaatttaagg acagagatga ttttttaag atggtaattc 13260

tatggagaaa acatgtatta tcatgcagaa tttgcactac ttatggacg gacctctatt 13320
 tattcgcaaa gtatcatgct aaagactgca atgtaaaatt acctttttt gtgagatcag 13380
 ttgctacttt cattatgcag ggtagtaagc tgcagggttc agaatgctac atactcttaa 13440
 cactaggcca ccacaacagt ttaccttgcc atggagaaaat acaaaattct aagatgaaaa 13500
 tagcagtgtg taatgatttt tatgctgcaa aaaaactcga caataaatca attgaagcta 13560
 attgtaaatc acttttgcg gggctaagaa tacctataaa taagaaggaa ctagatagac 13620
 agagaagatt attaacacta caaagcaatc attcttctgt agcaacagtt ggcggtagca 13680
 agatcataga gtctaagtgg ttaacaaaca aagcaagtac aataattgat tggtagaac 13740
 atattttaaa ttctccaaag ggcgaattaa attatgattt tttgaagca ttggagaaca 13800
 cttaccctaa tatgattaaa ctaatagata acttagggaa tgcagagatt aaaaaactga 13860
 tcaaagtaac aggatacatg cttgtaagta aaaaatgaaa aatgatgaag atgacaaaat 13920
 agatgacaac ttcatactat tctaaattaa ttatttgatt atgcaattat atgatagtt 13980
 attaaaattha aaaattaaaa atcaaaagtt aaaatttaaa acctatcatt aagtttattta 14040
 aaaataagaa attataattg aatgtatacg gttttttgc cgt 14083

<210> 4

<211> 187

<212> PRT

<213> human metapneumovirus

<400> 4

Met Ser Arg Lys Ala Pro Cys Lys Tyr Glu Val Arg Gly Lys Cys Asn
 1 5 10 15

Arg Gly Ser Glu Cys Lys Phe Asn His Asn Tyr Trp Ser Trp Pro Asp
 20 25 30

Arg Tyr Leu Leu Ile Arg Ser Asn Tyr Leu Leu Asn Gln Leu Leu Arg
 35 40 45

Asn Thr Asp Arg Ala Asp Gly Leu Ser Ile Ile Ser Gly Ala Gly Arg
 50 55 60

Glu Asp Arg Thr Gln Asp Phe Val Leu Gly Ser Thr Asn Val Val Gln
 65 70 75 80

Gly Tyr Ile Asp Asp Asn Gln Ser Ile Thr Lys Ala Ala Ala Cys Tyr
 85 90 95

Ser Leu His Asn Ile Ile Lys Gln Leu Gln Glu Val Glu Val Arg Gln
100 105 110

Ala Arg Asp Ser Lys Leu Ser Asp Ser Lys His Val Ala Leu His Asn
115 120 125

Leu Ile Leu Ser Tyr Met Glu Met Ser Lys Thr Pro Ala Ser Leu Ile
130 135 140

Asn Asn Leu Lys Arg Leu Pro Arg Glu Lys Leu Lys Lys Leu Ala Lys
145 150 155 160

Leu Ile Ile Asp Leu Ser Ala Gly Ala Asp Asn Asp Ser Ser Tyr Ala
165 170 175

Leu Gln Asp Ser Glu Ser Ile Asn Gln Val Gln
180 185

<210> 5

<211> 179

<212> PRT

<213> human metapneumovirus

<400> 5

Met Ile Thr Leu Asp Val Ile Lys Ser Asp Gly Ser Ser Lys Thr Cys
1 5 10 15

Thr His Leu Lys Lys Ile Ile Lys Asp His Ser Gly Lys Val Leu Ile
20 25 30

Ala Leu Lys Leu Ile Leu Ala Leu Leu Thr Phe Phe Thr Ile Thr Ile
35 40 45

Thr Ile Asn Tyr Ile Lys Val Glu Asn Asn Leu Gln Ile Cys Gln Ser
50 55 60

Lys Thr Glu Ser Asp Lys Glu Asp Ser Pro Ser Asn Thr Thr Ser Val
65 70 75 80

Thr Thr Lys Thr Thr Leu Asp His Asp Ile Thr Gln Tyr Phe Lys Arg
85 90 95

Leu Ile Gln Arg Tyr Thr Asp Ser Val Ile Asn Lys Asp Thr Cys Trp
100 105 110

Lys Ile Ser Arg Asn Gln Cys Thr Asn Ile Thr Thr Tyr Lys Phe Leu
25

115

120

125

Cys Phe Lys Pro Glu Asp Ser Lys Ile Asn Ser Cys Asp Arg Leu Thr
130 135 140

Asp Leu Cys Arg Asn Lys Ser Lys Ser Ala Ala Glu Ala Tyr His Thr
145 150 155 160

Val Glu Cys His Cys Ile Tyr Thr Ile Glu Trp Lys Cys Tyr His His
165 170 175

Ser Ile Asp

<210> 6

<211> 219

<212> PRT

<213> human metapneumovirus

<400> 6

Met Glu Val Lys Val Glu Asn Ile Arg Ala Ile Asp Met Leu Lys Ala
1 5 10 15

Arg Val Lys Asn Arg Val Ala Arg Ser Lys Cys Phe Lys Asn Ala Ser
20 25 30

Leu Ile Leu Ile Gly Ile Thr Thr Leu Ser Ile Ala Leu Asn Ile Tyr
35 40 45

Leu Ile Ile Asn Tyr Thr Ile Gln Lys Thr Ser Ser Glu Ser Glu His
50 55 60

His Thr Ser Ser Pro Pro Thr Glu Ser Asn Lys Glu Ala Ser Thr Ile
65 70 75 80

Ser Thr Asp Asn Pro Asp Ile Asn Pro Asn Ser Gln His Pro Thr Gln
85 90 95

Gln Ser Thr Glu Asn Pro Thr Leu Asn Pro Ala Ala Ser Val Ser Pro
100 105 110

Ser Glu Thr Glu Pro Ala Ser Thr Pro Asp Thr Thr Asn Arg Leu Ser
115 120 125

Ser Val Asp Arg Ser Thr Ala Gln Pro Ser Glu Ser Arg Thr Lys Thr
130 135 140

Lys Pro Thr Val His Thr Arg Asn Asn Pro Ser Thr Ala Ser Ser Thr
145 150 155 160

Gln Ser Pro Pro Arg Ala Thr Thr Lys Ala Ile Arg Arg Ala Thr Thr
165 170 175

Phe Arg Met Ser Ser Thr Gly Lys Arg Pro Thr Thr Thr Ser Val Gln
180 185 190

Ser Asp Ser Ser Thr Thr Thr Gln Asn His Glu Glu Thr Gly Ser Ala
195 200 205

Asn Pro Gln Ala Ser Val Ser Thr Met Gln Asn
210 215

<210> 7
<211> 2005
<212> PRT
<213> human metapneumovirus

<400> 7

Met Asp Pro Leu Asn Glu Ser Thr Val Asn Val Tyr Leu Pro Asp Ser
1 5 10 15

Tyr Leu Lys Gly Val Ile Ser Phe Ser Glu Thr Asn Ala Ile Gly Ser
20 25 30

Cys Leu Leu Lys Arg Pro Tyr Leu Lys Asn Asp Asn Thr Ala Lys Val
35 40 45

Ala Ile Glu Asn Pro Val Ile Glu His Val Arg Leu Lys Asn Ala Val
50 55 60

Asn Ser Lys Met Lys Ile Ser Asp Tyr Lys Val Val Glu Pro Val Asn
65 70 75 80

Met Gln His Glu Ile Met Lys Asn Val His Ser Cys Glu Leu Thr Leu
85 90 95

Leu Lys Gln Phe Leu Thr Arg Ser Lys Asn Ile Ser Thr Leu Lys Leu
100 105 110

Asn Met Ile Cys Asp Trp Leu Gln Leu Lys Ser Thr Ser Asp Asp Thr
115 120 125

Ser Ile Leu Ser Phe Ile Asp Val Glu Phe Ile Pro Ser Trp Val Ser
130 135 140

Asn Trp Phe Ser Asn Trp Tyr Asn Leu Asn Lys Leu Ile Leu Glu Phe
145 150 155 160

Arg Arg Glu Glu Val Ile Arg Thr Gly Ser Ile Leu Cys Arg Ser Leu
165 170 175

Gly Lys Leu Val Phe Ile Val Ser Ser Tyr Gly Cys Ile Val Lys Ser
180 185 190

Asn Lys Ser Lys Arg Val Ser Phe Phe Thr Tyr Asn Gln Leu Leu Thr
195 200 205

Trp Lys Asp Val Met Leu Ser Arg Phe Asn Ala Asn Phe Cys Ile Trp
210 215 220

Val Ser Asn Ser Leu Asn Glu Asn Gln Glu Gly Leu Gly Leu Arg Ser
225 230 235 240

Asn Leu Gln Gly Met Leu Thr Asn Lys Leu Tyr Glu Thr Val Asp Tyr
245 250 255

Met Leu Ser Leu Cys Cys Asn Glu Gly Phe Ser Leu Val Lys Glu Phe
260 265 270

Glu Gly Phe Ile Met Ser Glu Ile Leu Arg Ile Thr Glu His Ala Gln
275 280 285

Phe Ser Thr Arg Phe Arg Asn Thr Leu Leu Asn Gly Leu Thr Asp Gln
290 295 300

Leu Thr Lys Leu Lys Asn Lys Asn Arg Leu Arg Val His Ser Thr Val
305 310 315 320

Leu Glu Asn Asn Asp Tyr Pro Met Tyr Glu Val Val Leu Lys Leu Leu
325 330 335

Gly Asp Thr Leu Arg Cys Ile Lys Leu Leu Ile Asn Lys Asn Leu Glu
340 345 350

Asn Ala Ala Glu Leu Tyr Tyr Ile Phe Arg Ile Phe Gly His Pro Met
355 360 365

Val Asp Glu Arg Asp Ala Met Asp Ala Val Lys Leu Asn Asn Glu Ile
370 375 380

Thr Lys Ile Leu Arg Leu Glu Ser Leu Thr Glu Leu Arg Gly Ala Phe
385 390 395 400

Ile Leu Arg Ile Ile Lys Gly Phe Val Asp Asn Asn Lys Arg Trp Pro
405 410 415

Lys Ile Lys Asn Leu Lys Val Leu Ser Lys Arg Trp Thr Met Tyr Phe
420 425 430

Lys Ala Lys Asn Tyr Pro Ser Gln Leu Glu Leu Ser Glu Gln Asp Phe
435 440 445

Leu Glu Leu Ala Ala Ile Gln Phe Glu Gln Glu Phe Ser Val Pro Glu
450 455 460

Lys Thr Asn Leu Glu Met Val Leu Asn Asp Lys Ala Ile Ser Pro Pro
465 470 475 480

Lys Arg Leu Ile Trp Ser Val Tyr Pro Lys Asn Tyr Leu Pro Glu Thr
485 490 495

Ile Lys Asn Arg Tyr Leu Glu Glu Thr Phe Asn Ala Ser Asp Ser Leu
500 505 510

Lys Thr Arg Arg Val Leu Glu Tyr Tyr Leu Lys Asp Asn Lys Phe Asp
515 520 525

Gln Lys Glu Leu Lys Ser Tyr Val Val Arg Gln Glu Tyr Leu Asn Asp
530 535 540

Lys Glu His Ile Val Ser Leu Thr Gly Lys Glu Arg Glu Leu Ser Val
545 550 555 560

Gly Arg Met Phe Ala Met Gln Pro Gly Lys Gln Arg Gln Ile Gln Ile
565 570 575

Leu Ala Glu Lys Leu Leu Ala Asp Asn Ile Val Pro Phe Phe Pro Glu
580 585 590

Thr Leu Thr Lys Tyr Gly Asp Leu Asp Leu Gln Arg Ile Met Glu Ile
595 600 605

Lys Ser Glu Leu Ser Ser Ile Lys Thr Arg Arg Asn Asp Ser Tyr Asn
610 615 620

Asn Tyr Ile Ala Arg Ala Ser Ile Val Thr Asp Leu Ser Lys Phe Asn
625 630 635 640

Gln Ala Phe Arg Tyr Glu Thr Thr Ala Ile Cys Ala Asp Val Ala Asp
645 650 655

Glu Leu His Gly Thr Gln Ser Leu Phe Cys Trp Leu His Leu Ile Val
660 665 670

Pro Met Thr Thr Met Ile Cys Ala Tyr Arg His Ala Pro Pro Glu Thr
675 680 685

Lys Gly Glu Tyr Asp Ile Asp Lys Ile Glu Glu Gln Ser Gly Leu Tyr
690 695 700

Arg Tyr His Met Gly Gly Ile Glu Gly Trp Cys Gln Lys Leu Trp Thr
705 710 715 720

Met Glu Ala Ile Ser Leu Leu Asp Val Val Ser Val Lys Thr Arg Cys
725 730 735

Gln Met Thr Ser Leu Leu Asn Gly Asp Asn Gln Ser Ile Asp Val Ser
740 745 750

Lys Pro Val Lys Leu Ser Glu Gly Leu Asp Glu Val Lys Ala Asp Tyr
755 760 765

Arg Leu Ala Val Lys Met Leu Lys Glu Ile Arg Asp Ala Tyr Arg Asn
770 775 780

Ile Gly His Lys Leu Lys Glu Gly Glu Thr Tyr Ile Ser Arg Asp Leu
785 790 795 800

Gln Phe Ile Ser Lys Val Ile Gln Ser Glu Gly Val Met His Pro Thr
805 810 815

Pro Ile Lys Lys Val Leu Arg Val Gly Pro Trp Ile Asn Thr Ile Leu
820 825 830

Asp Asp Ile Lys Thr Ser Ala Glu Ser Ile Gly Ser Leu Cys Gln Glu
835 840 845

Leu Glu Phe Arg Gly Glu Ser Ile Ile Val Ser Leu Ile Leu Arg Asn
850 855 860

Phe Trp Leu Tyr Asn Leu Tyr Met His Glu Ser Lys Gln His Pro Leu
865 870 875 880

Ala Gly Lys Gln Leu Phe Lys Gln Leu Asn Lys Thr Leu Thr Ser Val
885 890 895

Gln Arg Phe Phe Glu Ile Lys Arg Glu Asn Glu Val Val Asp Leu Trp
900 905 910

Met Asn Ile Pro Met Gln Phe Gly Gly Gly Asp Pro Val Val Phe Tyr
915 920 925

Arg Ser Phe Tyr Arg Arg Thr Pro Asp Phe Leu Thr Glu Ala Ile Ser
930 935 940

His Val Asp Ile Leu Leu Lys Ile Ser Ala Asn Ile Lys Asn Glu Thr
945 950 955 960

Lys Val Ser Phe Phe Lys Ala Leu Leu Ser Ile Glu Lys Asn Glu Arg
965 970 975

Ala Thr Leu Thr Thr Leu Met Arg Asp Pro Gln Ala Val Gly Ser Glu
980 985 990

Arg Gln Ala Lys Val Thr Ser Asp Ile Asn Arg Thr Ala Val Thr Ser
995 1000 1005

Ile Leu Ser Leu Ser Pro Asn Gln Leu Phe Ser Asp Ser Ala Ile
1010 1015 1020

His Tyr Ser Arg Asn Glu Glu Glu Val Gly Ile Ile Ala Glu Asn
1025 1030 1035

Ile Thr Pro Val Tyr Pro His Gly Leu Arg Val Leu Tyr Glu Ser
1040 1045 1050

Leu Pro Phe His Lys Ala Glu Lys Val Val Asn Met Ile Ser Gly
1055 1060 1065

Thr Lys Ser Ile Thr Asn Leu Leu Gln Arg Thr Ser Ala Ile Asn
1070 1075 1080

Gly Glu Asp Ile Asp Arg Ala Val Ser Met Met Leu Glu Asn Leu
1085 1090 1095

Gly Leu Leu Ser Arg Ile Leu Ser Val Val Val Asp Ser Ile Glu
1100 1105 1110

Ile Pro Ile Lys Ser Asn Gly Arg Leu Ile Cys Cys Gln Ile Ser
1115 1120 1125

Arg Thr Leu Arg Glu Thr Ser Trp Asn Asn Met Glu Ile Val Gly
1130 1135 1140

Val Thr Ser Pro Ser Ile Thr Thr Cys Met Asp Val Ile Tyr Ala
1145 1150 1155

Thr Ser Ser His Leu Lys Gly Ile Ile Ile Glu Lys Phe Ser Thr
1160 1165 1170

Asp Arg Thr Thr Arg Gly Gln Arg Gly Pro Lys Ser Pro Trp Val
1175 1180 1185

Gly Ser Ser Thr Gln Glu Lys Lys Leu Val Pro Val Tyr Asn Arg
1190 1195 1200

Gln Ile Leu Ser Lys Gln Gln Arg Glu Gln Leu Glu Ala Ile Gly
1205 1210 1215

Lys Met Arg Trp Val Tyr Lys Gly Thr Pro Gly Leu Arg Arg Leu
1220 1225 1230

Leu Asn Lys Ile Cys Leu Gly Ser Leu Gly Ile Ser Tyr Lys Cys
1235 1240 1245

Val Lys Pro Leu Leu Pro Arg Phe Met Ser Val Asn Phe Leu His
1250 1255 1260

Arg Leu Ser Val Ser Ser Arg Pro Met Glu Phe Pro Ala Ser Val
1265 1270 1275

Pro Ala Tyr Arg Thr Thr Asn Tyr His Phe Asp Thr Ser Pro Ile
1280 1285 1290

Asn Gln Ala Leu Ser Glu Arg Phe Gly Asn Glu Asp Ile Asn Leu
1295 1300 1305

Val Phe Gln Asn Ala Ile Ser Cys Gly Ile Ser Ile Met Ser Val
1310 1315 1320

Val Glu Gln Leu Thr Gly Arg Ser Pro Lys Gln Leu Val Leu Ile
1325 1330 1335

Pro Gln Leu Glu Glu Ile Asp Ile Met Pro Pro Pro Val Phe Gln
1340 1345 1350

Gly Lys Phe Asn Tyr Lys Leu Val Asp Lys Ile Thr Ser Asp Gln
1355 1360 1365

His Ile Phe Ser Pro Asp Lys Ile Asp Met Leu Thr Leu Gly Lys
1370 1375 1380

Met Leu Met Pro Thr Ile Lys Gly Gln Lys Thr Asp Gln Phe Leu
1385 1390 1395

Asn Lys Arg Glu Asn Tyr Phe His Gly Asn Asn Leu Ile Glu Ser
1400 1405 1410

Leu Ser Ala Ala Leu Ala Cys His Trp Cys Gly Ile Leu Thr Glu
1415 1420 1425

Gln Cys Ile Glu Asn Asn Ile Phe Lys Lys Asp Trp Gly Asp Gly
1430 1435 1440

Phe Ile Ser Asp His Ala Phe Met Asp Phe Lys Ile Phe Leu Cys
1445 1450 1455

Val Phe Lys Thr Lys Leu Leu Cys Ser Trp Gly Ser Gln Gly Lys
1460 1465 1470

Asn Ile Lys Asp Glu Asp Ile Val Asp Glu Ser Ile Asp Lys Leu
1475 1480 1485

Leu Arg Ile Asp Asn Thr Phe Trp Arg Met Phe Ser Lys Val Met
1490 1495 1500

Phe Glu Pro Lys Val Lys Lys Arg Ile Met Leu Tyr Asp Val Lys
1505 1510 1515

Phe Leu Ser Leu Val Gly Tyr Ile Gly Phe Lys Asn Trp Phe Ile
1520 1525 1530

Glu Gln Leu Arg Ser Ala Glu Leu His Glu Ile Pro Trp Ile Val
1535 1540 1545

Asn Ala Glu Gly Asp Leu Val Glu Ile Lys Ser Ile Lys Ile Tyr
1550 1555 1560

Leu Gln Leu Ile Glu Gln Ser Leu Phe Leu Arg Ile Thr Val Leu
1565 1570 1575

Asn Tyr Thr Asp Met Ala His Ala Leu Thr Arg Leu Ile Arg Lys
1580 1585 1590

Lys Leu Met Cys Asp Asn Ala Leu Leu Thr Pro Ile Ser Ser Pro
1595 1600 1605

Met Val Asn Leu Thr Gln Val Ile Asp Pro Thr Thr Gln Leu Asp
1610 1615 1620

Tyr Phe Pro Lys-Ile Thr Phe Glu Arg Leu Lys Asn Tyr Asp Thr
1625 1630 1635

Ser Ser Asn Tyr Ala Lys Gly Lys Leu Thr Arg Asn Tyr Met Ile
1640 1645 1650

Leu Leu Pro Trp Gln His Val Asn Arg Tyr Asn Phe Val Phe Ser
1655 1660 1665

Ser Thr Gly Cys Lys Val Ser Leu Lys Thr Cys Ile Gly Lys Leu
1670 1675 1680

Met Lys Asp Leu Asn Pro Lys Val Leu Tyr Phe Ile Gly Glu Gly
1685 1690 1695

Ala Gly Asn Trp Met Ala Arg Thr Ala Cys Glu Tyr Pro Asp Ile
1700 1705 1710

Lys Phe Val Tyr Arg Ser Leu Lys Asp Asp Leu Asp His His Tyr
1715 1720 1725

Pro Leu Glu Tyr Gln Arg Val Ile Gly Glu Leu Ser Arg Ile Ile
1730 1735 1740

Asp Ser Gly Glu Gly Leu Ser Met Glu Thr Thr Asp Ala Thr Gln
1745 1750 1755

Lys Thr His Trp Asp Leu Ile His Arg Val Ser Lys Asp Ala Leu
1760 1765 1770

Leu Ile Thr Leu Cys Asp Ala Glu Phe Lys Asp Arg Asp Asp Phe
1775 1780 1785

Phe Lys Met Val Ile Leu Trp Arg Lys His Val Leu Ser Cys Arg
1790 1795 1800

Ile Cys Thr Thr Tyr Gly Thr Asp Leu Tyr Leu Phe Ala Lys Tyr
1805 1810 1815

His Ala Lys Asp Cys Asn Val Lys Leu Pro Phe Phe Val Arg Ser
1820 1825 1830

Val Ala Thr Phe Ile Met Gln Gly Ser Lys Leu Ser Gly Ser Glu
1835 1840 1845

Cys Tyr Ile Leu Leu Thr Leu Gly His His Asn Ser Leu Pro Cys
1850 1855 1860

His Gly Glu Ile Gln Asn Ser Lys Met Lys Ile Ala Val Cys Asn
1865 1870 1875

Asp Phe Tyr Ala Ala Lys Lys Leu Asp Asn Lys Ser Ile Glu Ala
1880 1885 1890

Asn Cys Lys Ser Leu Leu Ser Gly Leu Arg Ile Pro Ile Asn Lys
1895 1900 1905

Lys Glu Leu Asp Arg Gln Arg Arg Leu Leu Thr Leu Gln Ser Asn
1910 1915 1920

His Ser Ser Val Ala Thr Val Gly Gly Ser Lys Ile Ile Glu Ser
1925 1930 1935

Lys Trp Leu Thr Asn Lys Ala Ser Thr Ile Ile Asp Trp Leu Glu
1940 1945 1950

His Ile Leu Asn Ser Pro Lys Gly Glu Leu Asn Tyr Asp Phe Phe
1955 1960 1965

Glu Ala Leu Glu Asn Thr Tyr Pro Asn Met Ile Lys Leu Ile Asp
1970 1975 1980

Asn Leu Gly Asn Ala Glu Ile Lys Lys Leu Ile Lys Val Thr Gly
1985 1990 1995

Tyr Met Leu Val Ser Lys Lys
2000 2005

<210> 8
<211> 177
<212> PRT
<213> human metapneumovirus

<400> 8

Met Lys Thr Leu Asp Val Ile Lys Ser Asp Gly Ser Ser Glu Thr Cys
1 5 10 15

Asn Gln Leu Lys Lys Ile Ile Lys Lys His Ser Gly Lys Leu Leu Ile
20 25 30

Ala Ser Lys Pro Thr Leu Ala Leu Leu Thr Ser Phe Thr Val Thr Ile
35 40 45

Thr Val Asn Tyr Thr Lys Val Glu Asn Asn Leu Gln Ala Cys Gln Leu
50 55 60

Lys Asn Glu Ser Asp Lys Lys Asp Thr Lys Leu Asn Thr Thr Ser Thr
65 70 75 80

Thr Ile Arg Pro Ile Pro Asp Leu Asn Ala Val Gln Tyr Leu Lys Arg
85 90 95

Leu Ile Gln Lys His Thr Asn Ser Val Thr Lys Asp Arg Asp Thr Cys
100 105 110

Trp Arg Ile His Thr Asn Gln Cys Thr Asn Ile Lys Ile Tyr Lys Phe
115 120 125

Leu Cys Phe Gly Ser Met Asn Ser Thr Asn Thr Asp Cys Glu Glu Pro
130 135 140

Thr Val Leu Cys Asp Lys Lys Ser Lys Thr Met Thr Glu Lys His Arg
145 150 155 160

Lys Ala Glu Cys His Arg Pro His Thr Thr Glu Trp Trp Cys His Tyr
165 170 175

Leu

<210> 9
<211> 236
<212> PRT
<213> human metapneumovirus

<400> 9

Met Glu Ala Arg Val Glu Asn Ile Arg Ala Ile Asp Met Phe Lys Ala
1 5 10 15

Lys Met Lys Asn Arg Ile Arg Ser Ser Lys Cys His Arg Asn Ala Thr
20 25 30

Leu Ile Leu Ile Gly Ser Thr Ala Pro Ser Met Ala Leu Asn Thr Leu
35 40 45

Leu Ile Ile Asp His Ala Thr Ser Lys Asn Met Thr Lys Val Glu His
50 55 60

Cys Val Asn Met Pro Pro Val Glu Pro Ser Lys Lys Thr Pro Met Thr
65 70 75 80

Ser Ala Ala Asp Pro Asn Thr Lys Pro Asn Pro Gln Gln Ala Thr Gln
85 90 95

Leu Thr Thr Glu Asp Ser Thr Ser Leu Ala Ala Thr Leu Glu Asp His
100 105 110

Leu His Thr Gly Thr Pro Thr Pro Asp Ala Thr Val Ser Gln Gln
115 120 125

Thr Thr Asp Glu His Thr Thr Leu Leu Arg Ser Thr Asn Arg Gln Thr
130 135 140

Thr Gln Thr Thr Ala Glu Lys Lys Pro Thr Arg Ala Thr Thr Lys Lys
145 150 155 160

Glu Thr Thr Arg Thr Thr Ser Thr Ala Ala Thr Gln Thr Leu Asn
165 170 175

Thr Thr Asn Gln Thr Ser Asn Gly Arg Glu Ala Thr Thr Ser Ala
180 185 190

Arg Ser Arg Asn Asn Ala Thr Thr Gln Ser Ser Asp Gln Thr Thr Gln

195

200

205

Ala Ala Asp Pro Ser Ser Gln Ser Gln His Thr Gln Lys Ser Thr Thr
 210 215 220

Thr Thr His Asn Thr Asp Thr Ser Ser Pro Ser Ser
 225 230 235

<210> 10
 <211> 183
 <212> PRT
 <213> human metapneumovirus
 <400> 10

Met Ile Thr Leu Asp Val Ile Lys Ser Asp Gly Ser Ser Lys Thr Cys
 1 5 10 15

Thr His Leu Lys Lys Ile Ile Lys Asp His Ser Gly Lys Val Leu Ile
 20 25 30

Val Leu Lys Leu Ile Leu Ala Leu Leu Thr Phe Leu Thr Val Thr Ile
 35 40 45

Thr Ile Asn Tyr Ile Lys Val Glu Asn Asn Leu Gln Ile Cys Gln Ser
 50 55 60

Lys Thr Glu Ser Asp Lys Lys Asp Ser Ser Ser Asn Thr Thr Ser Val
 65 70 75 80

Thr Thr Lys Thr Thr Leu Asn His Asp Ile Thr Gln Tyr Phe Lys Ser
 85 90 95

Leu Ile Gln Arg Tyr Thr Asn Ser Ala Ile Asn Ser Asp Thr Cys Trp
 100 105 110

Lys Ile Asn Arg Asn Gln Cys Thr Asn Ile Thr Thr Tyr Lys Phe Leu
 115 120 125

Cys Phe Lys Ser Glu Asp Thr Lys Thr Asn Asn Cys Asp Lys Leu Thr
 130 135 140

Asp Leu Cys Arg Asn Lys Pro Lys Pro Ala Val Gly Val Tyr His Ile
 145 150 155 160

Val Glu Cys His Cys Ile Tyr Thr Val Lys Trp Lys Cys Tyr His Tyr
 165 170 175

Pro Thr Asp Glu Thr Gln Ser
180

<210> 11
<211> 236
<212> PRT
<213> human metapneumovirus

<400> 11

Met Glu Val Lys Val Glu Asn Ile Arg Thr Ile Asp Met Leu Lys Ala
1 5 10 15

Arg Val Lys Asn Arg Val Ala Arg Ser Lys Cys Phe Lys Asn Ala Ser
20 25 30

Leu Val Leu Ile Gly Ile Thr Thr Leu Ser Ile Ala Leu Asn Ile Tyr
35 40 45

Leu Ile Ile Asn Tyr Lys Met Gln Lys Asn Thr Ser Glu Ser Glu His
50 55 60

His Thr Ser Ser Ser Pro Met Glu Ser Ser Arg Glu Thr Pro Thr Val
65 70 75 80

Pro Thr Asp Asn Ser Asp Thr Asn Ser Ser Pro Gln His Pro Thr Gln
85 90 95

Gln Ser Thr Glu Gly Ser Thr Leu Tyr Phe Ala Ala Ser Ala Ser Ser
100 105 110

Pro Glu Thr Glu Pro Thr Ser Thr Pro Asp Thr Thr Asn Arg Pro Pro
115 120 125

Phe Val Asp Thr His Thr Thr Pro Pro Ser Ala Ser Arg Thr Lys Thr
130 135 140

Ser Pro Ala Val His Thr Lys Asn Asn Pro Arg Thr Ser Ser Arg Thr
145 150 155 160

His Ser Pro Pro Arg Ala Thr Thr Arg Thr Ala Arg Arg Thr Thr Thr
165 170 175

Leu Arg Thr Ser Ser Thr Arg Lys Arg Pro Ser Thr Ala Ser Val Gln
180 185 190

Pro Asp Ile Ser Ala Thr Thr His Lys Asn Glu Glu Ala Ser Pro Ala
195 200 205

Ser Pro Gln Thr Ser Ala Ser Thr Thr Arg Ile Gln Arg Lys Ser Val
210 215 220

Glu Ala Asn Thr Ser Thr Thr Tyr Asn Gln Thr Ser
225 230 235

<210> 12

<211> 2005

<212> PRT

<213> human metapneumovirus

<400> 12

Met Asp Pro Leu Asn Glu Ser Thr Val Asn Val Tyr Leu Pro Asp Ser
1 5 10 15

Tyr Leu Lys Gly Val Ile Ser Phe Ser Glu Thr Asn Ala Ile Gly Ser
20 25 30

Cys Leu Leu Lys Arg Pro Tyr Leu Lys Asn Asp Asn Thr Ala Lys Val
35 40 45

Ala Ile Glu Asn Pro Val Ile Glu His Val Arg Leu Lys Asn Ala Val
50 55 60

Asn Ser Lys Met Lys Ile Ser Asp Tyr Lys Ile Val Glu Pro Val Asn
65 70 75 80

Met Gln His Glu Ile Met Lys Asn Val His Ser Cys Glu Leu Thr Leu
85 90 95

Leu Lys Gln Phe Leu Thr Arg Ser Lys Asn Ile Ser Thr Leu Lys Leu
100 105 110

Asn Met Ile Cys Asp Trp Leu Gln Leu Lys Ser Thr Ser Asp Asp Thr
115 120 125

Ser Ile Leu Ser Phe Ile Asp Val Glu Phe Ile Pro Ser Trp Val Ser
130 135 140

Asn Trp Phe Ser Asn Trp Tyr Asn Leu Asn Lys Leu Ile Leu Glu Phe
145 150 155 160

Arg Lys Glu Glu Val Ile Arg Thr Gly Ser Ile Leu Cys Arg Ser Leu
165 170 175

Gly Lys Leu Val Phe Val Val Ser Ser Tyr Gly Cys Ile Val Lys Ser
180 185 190

Asn Lys Ser Lys Arg Val Ser Phe Phe Thr Tyr Asn Gln Leu Leu Thr
195 200 205

Trp Lys Asp Val Met Leu Ser Arg Phe Asn Ala Asn Phe Cys Ile Trp
210 215 220

Val Ser Asn Ser Leu Asn Glu Asn Gln Glu Gly Leu Gly Leu Arg Ser
225 230 235 240

Asn Leu Gln Gly Ile Leu Thr Asn Lys Leu Tyr Glu Thr Val Asp Tyr
245 250 255

Met Leu Ser Leu Cys Cys Asn Glu Gly Phe Ser Leu Val Lys Glu Phe
260 265 270

Glu Gly Phe Ile Met Ser Glu Ile Leu Arg Ile Thr Glu His Ala Gln
275 280 285

Phe Ser Thr Arg Phe Arg Asn Thr Leu Leu Asn Gly Leu Thr Asp Gln
290 295 300

Leu Thr Lys Leu Lys Asn Lys Asn Arg Leu Arg Val His Gly Thr Val
305 310 315 320

Leu Glu Asn Asn Asp Tyr Pro Met Tyr Glu Val Val Leu Lys Leu Leu
325 330 335

Gly Asp Thr Leu Arg Cys Ile Lys Leu Leu Ile Asn Lys Asn Leu Glu
340 345 350

Asn Ala Ala Glu Leu Tyr Tyr Ile Phe Arg Ile Phe Gly His Pro Met
355 360 365

Val Asp Glu Arg Asp Ala Met Asp Ala Val Lys Leu Asn Asn Glu Ile
370 375 380

Thr Lys Ile Leu Arg Trp Glu Ser Leu Thr Glu Leu Arg Gly Ala Phe
385 390 395 400

Ile Leu Arg Ile Ile Lys Gly Phe Val Asp Asn Asn Lys Arg Trp Pro
405 410 415

Lys Ile Lys Asn Leu Lys Val Leu Ser Lys Arg Trp Thr Met Tyr Phe
420 425 430

Lys Ala Lys Ser Tyr Pro Ser Gln Leu Glu Leu Ser Glu Gln Asp Phe
435 440 445

Leu Glu Leu Ala Ala Ile Gln Phe Glu Gln Glu Phe Ser Val Pro Glu
450 455 460

Lys Thr Asn Leu Glu Met Val Leu Asn Asp Lys Ala Ile Ser Pro Pro
465 470 475 480

Lys Arg Leu Ile Trp Ser Val Tyr Pro Lys Asn Tyr Leu Pro Glu Lys
485 490 495

Ile Lys Asn Arg Tyr Leu Glu Glu Thr Phe Asn Ala Ser Asp Ser Leu
500 505 510

Lys Thr Arg Arg Val Leu Glu Tyr Tyr Leu Lys Asp Asn Lys Phe Asp
515 520 525

Gln Lys Glu Leu Lys Ser Tyr Val Val Lys Gln Glu Tyr Leu Asn Asp
530 535 540

Lys Asp His Ile Val Ser Leu Thr Gly Lys Glu Arg Glu Leu Ser Val
545 550 555 560

Gly Arg Met Phe Ala Met Gln Pro Gly Lys Gln Arg Gln Ile Gln Ile
565 570 575

Leu Ala Glu Lys Leu Leu Ala Asp Asn Ile Val Pro Phe Phe Pro Glu
580 585 590

Thr Leu Thr Lys Tyr Gly Asp Leu Asp Leu Gln Arg Ile Met Glu Ile
595 600 605

Lys Ser Glu Leu Ser Ser Ile Lys Thr Arg Arg Asn Asp Ser Tyr Asn
610 615 620

Asn Tyr Ile Ala Arg Ala Ser Ile Val Thr Asp Leu Ser Lys Phe Asn
625 630 635 640

Gln Ala Phe Arg Tyr Glu Thr Thr Ala Ile Cys Ala Asp Val Ala Asp
645 650 655

Glu Leu His Gly Thr Gln Ser Leu Phe Cys Trp Leu His Leu Ile Val
660 665 670

Pro Met Thr Thr Met Ile Cys Ala Tyr Arg His Ala Pro Pro Glu Thr
675 680 685

Lys Gly Glu Tyr Asp Ile Asp Lys Ile Glu Glu Gln Ser Gly Leu Tyr
690 695 700

Arg Tyr His Met Gly Gly Ile Glu Gly Trp Cys Gln Lys Leu Trp Thr
705 710 715 720

Met Glu Ala Ile Ser Leu Leu Asp Val Val Ser Val Lys Thr Arg Cys
725 730 735

Gln Met Thr Ser Leu Leu Asn Gly Asp Asn Gln Ser Ile Asp Val Ser
740 745 750

Lys Pro Val Lys Leu Ser Glu Gly Leu Asp Glu Val Lys Ala Asp Tyr
755 760 765

Ser Leu Ala Val Lys Met Leu Lys Glu Ile Arg Asp Ala Tyr Arg Asn
770 775 780

Ile Gly His Lys Leu Lys Glu Gly Glu Thr Tyr Ile Ser Arg Asp Leu
785 790 795 800

Gln Phe Ile Ser Lys Val Ile Gln Ser Glu Gly Val Met His Pro Thr
805 810 815

Pro Ile Lys Lys Ile Leu Arg Val Gly Pro Trp Ile Asn Thr Ile Leu
820 825 830

Asp Asp Ile Lys Thr Ser Ala Glu Ser Ile Gly Ser Leu Cys Gln Glu
835 840 845

Leu Glu Phe Arg Gly Glu Ser Ile Ile Val Ser Leu Ile Leu Arg Asn
850 855 860

Phe Trp Leu Tyr Asn Leu Tyr Met His Glu Ser Lys Gln His Pro Leu
865 870 875 880

Ala Gly Lys Gln Leu Phe Lys Gln Leu Asn Lys Thr Leu Thr Ser Val
885 890 895

Gln Arg Phe Phe Glu Ile Lys Lys Glu Asn Glu Val Val Asp Leu Trp
900 905 910

Met Asn Ile Pro Met Gln Phe Gly Gly Gly Asp Pro Val Val Phe Tyr
915 920 925

Arg Ser Phe Tyr Arg Arg Thr Pro Asp Phe Leu Thr Glu Ala Ile Ser
930 935 940

His Val Asp Ile Leu Leu Arg Ile Ser Ala Asn Ile Arg Asn Glu Ala
945 950 955 960

Lys Ile Ser Phe Phe Lys Ala Leu Leu Ser Ile Glu Lys Asn Glu Arg
965 970 975

Ala Thr Leu Thr Thr Leu Met Arg Asp Pro Gln Ala Val Gly Ser Glu
980 985 990

Arg Gln Ala Lys Val Thr Ser Asp Ile Asn Arg Thr Ala Val Thr Ser
995 1000 1005

Ile Leu Ser Leu Ser Pro Asn Gln Leu Phe Ser Asp Ser Ala Ile
1010 1015 1020

His Tyr Ser Arg Asn Glu Glu Glu Val Gly Ile Ile Ala Asp Asn
1025 1030 1035

Ile Thr Pro Val Tyr Pro His Gly Leu Arg Val Leu Tyr Glu Ser
1040 1045 1050

Leu Pro Phe His Lys Ala Glu Lys Val Val Asn Met Ile Ser Gly
1055 1060 1065

Thr Lys Ser Ile Thr Asn Leu Leu Gln Arg Thr Ser Ala Ile Asn
1070 1075 1080

Gly Glu Asp Ile Asp Arg Ala Val Ser Met Met Leu Glu Asn Leu
1085 1090 1095

Gly Leu Leu Ser Arg Ile Leu Ser Val Val Val Asp Ser Ile Glu
1100 1105 1110

Ile Pro Thr Lys Ser Asn Gly Arg Leu Ile Cys Cys Gln Ile Ser
1115 1120 1125

Arg Thr Leu Arg Glu Thr Ser Trp Asn Asn Met Glu Ile Val Gly
1130 1135 1140

Val Thr Ser Pro Ser Ile Thr Thr Cys Met Asp Val Ile Tyr Ala
1145 1150 1155

Thr Ser Ser His Leu Lys Gly Ile Ile Ile Glu Lys Phe Ser Thr
1160 1165 1170

Asp Arg Thr Thr Arg Gly Gln Arg Gly Pro Lys Ser Pro Trp Val
1175 1180 1185

Gly Ser Ser Thr Gln Glu Lys Lys Leu Val Pro Val Tyr Asn Arg
1190 1195 1200

Gln Ile Leu Ser Lys Gln Gln Arg Glu Gln Leu Glu Ala Ile Gly
1205 1210 1215

Lys Met Arg Trp Val Tyr Lys Gly Thr Pro Gly Leu Arg Arg Leu
1220 1225 1230

Leu Asn Lys Ile Cys Leu Gly Ser Leu Gly Ile Ser Tyr Lys Cys
1235 1240 1245

Val Lys Pro Leu Leu Pro Arg Phe Met Ser Val Asn Phe Leu His
1250 1255 1260

Arg Leu Ser Val Ser Ser Arg Pro Met Glu Phe Pro Ala Ser Val
1265 1270 1275

Pro Ala Tyr Arg Thr Thr Asn Tyr His Phe Asp Thr Ser Pro Ile
1280 1285 1290

Asn Gln Ala Leu Ser Glu Arg Phe Gly Asn Glu Asp Ile Asn Leu
1295 1300 1305

Val Phe Gln Asn Ala Ile Ser Cys Gly Ile Ser Ile Met Ser Val
1310 1315 1320

Val Glu Gln Leu Thr Gly Arg Ser Pro Lys Gln Leu Val Leu Ile
1325 1330 1335

Pro Gln Leu Glu Glu Ile Asp Ile Met Pro Pro Pro Val Phe Gln
1340 1345 1350

Gly Lys Phe Asn Tyr Lys Leu Val Asp Lys Ile Thr Ser Asp Gln
1355 1360 1365

His Ile Phe Ser Pro Asp Lys Ile Asp Met Leu Thr Leu Gly Lys
1370 1375 1380

Met Leu Met Pro Thr Ile Lys Gly Gln Lys Thr Asp Gln Phe Leu
1385 1390 1395

Asn Lys Arg Glu Asn Tyr Phe His Gly Asn Asn Leu Ile Glu Ser
1400 1405 1410

Leu Ser Ala Ala Leu Ala Cys His Trp Cys Gly Ile Leu Thr Glu
1415 1420 1425

Gln Cys Ile Glu Asn Asn Ile Phe Lys Lys Asp Trp Gly Asp Gly
1430 1435 1440

Phe Ile Ser Asp His Ala Phe Met Asp Phe Lys Ile Phe Leu Cys
1445 1450 1455

Val Phe Lys Thr Lys Leu Leu Cys Ser Trp Gly Ser Gln Gly Lys
1460 1465 1470

Asn Ile Lys Asp Glu Asp Ile Val Asp Glu Ser Ile Asp Lys Leu
1475 1480 1485

Leu Arg Ile Asp Asn Thr Phe Trp Arg Met Phe Ser Lys Val Met
1490 1495 1500

Phe Glu Ser Lys Val Lys Lys Arg Ile Met Leu Tyr Asp Val Lys
1505 1510 1515

Phe Leu Ser Leu Val Gly Tyr Ile Gly Phe Lys Asn Trp Phe Ile
1520 1525 1530

Glu Gln Leu Arg Ser Ala Glu Leu His Glu Val Pro Trp Ile Val
1535 1540 1545

Asn Ala Glu Gly Asp Leu Val Glu Ile Lys Ser Ile Lys Ile Tyr
1550 1555 1560

Leu Gln Leu Ile Glu Gln Ser Leu Phe Leu Arg Ile Thr Val Leu
1565 1570 1575

Asn Tyr Thr Asp Met Ala His Ala Leu Thr Arg Leu Ile Arg Lys
1580 1585 1590

Lys Leu Met Cys Asp Asn Ala Leu Leu Thr Pro Ile Pro Ser Pro
1595 1600 1605

Met Val Asn Leu Thr Gln Val Ile Asp Pro Thr Glu Gln Leu Ala
1610 1615 1620

Tyr Phe Pro Lys Ile Thr Phe Glu Arg Leu Lys Asn Tyr Asp Thr
1625 1630 1635

Ser Ser Asn Tyr Ala Lys Gly Lys Leu Thr Arg Asn Tyr Met Ile
1640 1645 1650

Leu Leu Pro Trp Gln His Val Asn Arg Tyr Asn Phe Val Phe Ser
1655 1660 1665

Ser Thr Gly Cys Lys Val Ser Leu Lys Thr Cys Ile Gly Lys Leu
1670 1675 1680

Met Lys Asp Leu Asn Pro Lys Val Leu Tyr Phe Ile Gly Glu Gly
1685 1690 1695

Ala Gly Asn Trp Met Ala Arg Thr Ala Cys Glu Tyr Pro Asp Ile
1700 1705 1710

Lys Phe Val Tyr Arg Ser Leu Lys Asp Asp Leu Asp His His Tyr
1715 1720 1725

Pro Leu Glu Tyr Gln Arg Val Ile Gly Glu Leu Ser Arg Ile Ile
1730 1735 1740

Asp Ser Gly Glu Gly Leu Ser Met Glu Thr Thr Asp Ala Thr Gln
1745 1750 1755

Lys Thr His Trp Asp Leu Ile His Arg Val Ser Lys Asp Ala Leu
1760 1765 1770

Leu Ile Thr Leu Cys Asp Ala Glu Phe Lys Asp Arg Asp Asp Phe
1775 1780 1785

Phe Lys Met Val Ile Leu Trp Arg Lys His Val Leu Ser Cys Arg
1790 1795 1800

Ile Cys Thr Thr Tyr Gly Thr Asp Leu Tyr Leu Phe Ala Lys Tyr
1805 1810 1815

His Ala Lys Asp Cys Asn Val Lys Leu Pro Phe Phe Val Arg Ser
1820 1825 1830

Val Ala Thr Phe Ile Met Gln Gly Ser Lys Leu Ser Gly Ser Glu
1835 1840 1845

Cys Tyr Ile Leu Leu Thr Leu Gly His His Asn Asn Leu Pro Cys
1850 1855 1860

His Gly Glu Ile Gln Asn Ser Lys Met Lys Ile Ala Val Cys Asn
1865 1870 1875

Asp Phe Tyr Ala Ala Lys Lys Leu Asp Asn Lys Ser Ile Glu Ala
1880 1885 1890

Asn Cys Lys Ser Leu Leu Ser Gly Leu Arg Ile Pro Ile Asn Lys
1895 1900 1905

Lys Glu Leu Asn Arg Gln Arg Arg Leu Leu Thr Leu Gln Ser Asn
1910 1915 1920

His Ser Ser Val Ala Thr Val Gly Gly Ser Lys Val Ile Glu Ser
1925 1930 1935

Lys Trp Leu Thr Asn Lys Ala Asn Thr Ile Ile Asp Trp Leu Glu
1940 1945 1950

His Ile Leu Asn Ser Pro Lys Gly Glu Leu Asn Tyr Asp Phe Phe
1955 1960 1965

Glu Ala Leu Glu Asn Thr Tyr Pro Asn Met Ile Lys Leu Ile Asp
1970 1975 1980

Asn Leu Gly Asn Ala Glu Ile Lys Lys Leu Ile Lys Val Thr Gly
1985 1990 1995

Tyr Met Leu Val Ser Lys Lys
2000 2005

<210> 13
<211> 2165
<212> PRT

<213> human respiratory syncytial virus strain A2

<400> 13

Met Asp Pro Ile Ile Asn Gly Asn Ser Ala Asn Val Tyr Leu Thr Asp
1. 5 10 15

Ser Tyr Leu Lys Gly Val Ile Ser Phe Ser Glu Cys Asn Ala Leu Gly
20 25 30

Ser Tyr Ile Phe Asn Gly Pro Tyr Leu Lys Asn Asp Tyr Thr Asn Leu
35 40 45

Ile Ser Arg Gln Asn Pro Leu Ile Glu His Met Asn Leu Lys Lys Leu
50 55 60

Asn Ile Thr Gln Ser Leu Ile Ser Lys Tyr His Lys Gly Glu Ile Lys
65 70 75 80

Leu Glu Glu Pro Thr Tyr Phe Gln Ser Leu Leu Met Thr Tyr Lys Ser
85 90 95

Met Thr Ser Ser Glu Gln Ile Ala Thr Thr Asn Leu Leu Lys Lys Ile
100 105 110

Ile Arg Arg Ala Ile Glu Ile Ser Asp Val Lys Val Tyr Ala Ile Leu
115 120 125

Asn Lys Leu Gly Leu Lys Glu Lys Asp Lys Ile Lys Ser Asn Asn Gly
130 135 140

Gln Asp Glu Asp Asn Ser Val Ile Thr Thr Ile Ile Lys Asp Asp Ile
145 150 155 160

Leu Ser Ala Val Lys Asp Asn Gln Ser His Leu Lys Ala Asp Lys Asn
165 170 175

His Ser Thr Lys Gln Lys Asp Thr Ile Lys Thr Thr Leu Leu Lys Lys
180 185 190

Leu Met Cys Ser Met Gln His Pro Pro Ser Trp Leu Ile His Trp Phe
195 200 205

Asn Leu Tyr Thr Lys Leu Asn Asn Ile Leu Thr Gln Tyr Arg Ser Asn

210

215

220

Glu Val Lys Asn His Gly Phe Thr Leu Ile Asp Asn Gln Thr Leu Ser
225 230 235 240

Gly Phe Gln Phe Ile Leu Asn Gln Tyr Gly Cys Ile Val Tyr His Lys
245 250 255

Glu Leu Lys Arg Ile Thr Val Thr Tyr Asn Gln Phe Leu Thr Trp
260 265 270

Lys Asp Ile Ser Leu Ser Arg Leu Asn Val Cys Leu Ile Thr Trp Ile
275 280 285

Ser Asn Cys Leu Asn Thr Leu Asn Lys Ser Leu Gly Leu Arg Cys Gly
290 295 300

Phe Asn Asn Val Ile Leu Thr Gln Leu Phe Leu Tyr Gly Asp Cys Ile
305 310 315 320

Leu Lys Leu Phe His Asn Glu Gly Phe Tyr Ile Ile Lys Glu Val Glu
325 330 335

Gly Phe Ile Met Ser Leu Ile Leu Asn Ile Thr Glu Glu Asp Gln Phe
340 345 350

Arg Lys Arg Phe Tyr Asn Ser Met Leu Asn Asn Ile Thr Asp Ala Ala
355 360 365

Asn Lys Ala Gln Lys Asn Leu Leu Ser Arg Val Cys His Thr Leu Leu
370 375 380

Asp Lys Thr Val Ser Asp Asn Ile Ile Asn Gly Arg Trp Ile Ile Leu
385 390 395 400

Leu Ser Lys Phe Leu Lys Leu Ile Lys Leu Ala Gly Asp Asn Asn Leu
405 410 415

Asn Asn Leu Ser Glu Leu Tyr Phe Leu Phe Arg Ile Phe Gly His Pro
420 425 430

Met Val Asp Glu Arg Gln Ala Met Asp Ala Val Lys Ile Asn Cys Asn
435 440 445

Glu Thr Lys Phe Tyr Leu Leu Ser Ser Leu Ser Met Leu Arg Gly Ala

450

455

460

Phe Ile Tyr Arg Ile Ile Lys Gly Phe Val Asn Asn Tyr Asn Arg Trp
 465 470 475 480

Pro Thr Leu Arg Asn Ala Ile Val Leu Pro Leu Arg Trp Leu Thr Tyr
 485 490 495

Tyr Lys Leu Asn Thr Tyr Pro Ser Leu Leu Glu Leu Thr Glu Arg Asp
 500 505 510

Leu Ile Val Leu Ser Gly Leu Arg Phe Tyr Arg Glu Phe Arg Leu Pro
 515 520 525

Lys Lys Val Asp Leu Glu Met Ile Ile Asn Asp Lys Ala Ile Ser Pro
 530 535 540

Pro Lys Asn Leu Ile Trp Thr Ser Phe Pro Arg Asn Tyr Met Pro Ser
 545 550 555 560

His Ile Gln Asn Tyr Ile Glu His Glu Lys Leu Lys Phe Ser Glu Ser
 565 570 575

Asp Lys Ser Arg Arg Val Leu Glu Tyr Tyr Leu Arg Asp Asn Lys Phe
 580 585 590

Asn Glu Cys Asp Leu Tyr Asn Cys Val Val Asn Gln Ser Tyr Leu Asn
 595 600 605

Asn Pro Asn His Val Val Ser Leu Thr Gly Lys Glu Arg Glu Leu Ser
 610 615 620

Val Gly Arg Met Phe Ala Met Gln Pro Gly Met Phe Arg Gln Val Gln
 625 630 635 640

Ile Leu Ala Glu Lys Met Ile Ala Glu Asn Ile Leu Gln Phe Phe Pro
 645 650 655

Glu Ser Leu Thr Arg Tyr Gly Asp Leu Glu Leu Gln Lys Ile Leu Glu
 660 665 670

Leu Lys Ala Gly Ile Ser Asn Lys Ser Asn Arg Tyr Asn Asp Asn Tyr
 675 680 685

Asn Asn Tyr Ile Ser Lys Cys Ser Ile Ile Thr Asp Leu Ser Lys Phe

690

695

700

Asn Gln Ala Phe Arg Tyr Glu Thr Ser Cys Ile Cys Ser Asp Val Leu
 705 710 715 720

Asp Glu Leu His Gly Val Gln Ser Leu Phe Ser Trp Leu His Leu Thr
 725 730 735

Ile Pro His Val Thr Ile Ile Cys Thr Tyr Arg His Ala Pro Pro Tyr
 740 745 750

Ile Gly Asp His Ile Val Asp Leu Asn Asn Val Asp Glu Gln Ser Gly
 755 760 765

Leu Tyr Arg Tyr His Met Gly Gly Ile Glu Gly Trp Cys Gln Lys Leu
 770 775 780

Trp Thr Ile Glu Ala Ile Ser Leu Leu Asp Leu Ile Ser Leu Lys Gly
 785 790 795 800

Lys Phe Ser Ile Thr Ala Leu Ile Asn Gly Asp Asn Gln Ser Ile Asp
 805 810 815

Ile Ser Lys Pro Ile Arg Leu Met Glu Gly Gln Thr His Ala Gln Ala
 820 825 830

Asp Tyr Leu Leu Ala Leu Asn Ser Leu Lys Leu Leu Tyr Lys Glu Tyr
 835 840 845

Ala Gly Ile Gly His Lys Leu Lys Gly Thr Glu Thr Tyr Ile Ser Arg
 850 855 860

Asp Met Gln Phe Met Ser Lys Thr Ile Gln His Asn Gly Val Tyr Tyr
 865 870 875 880

Pro Ala Ser Ile Lys Lys Val Leu Arg Val Gly Pro Trp Ile Asn Thr
 885 890 895

Ile Leu Asp Asp Phe Lys Val Ser Leu Glu Ser Ile Gly Ser Leu Thr
 900 905 910

Gln Glu Leu Glu Tyr Arg Gly Glu Ser Leu Leu Cys Ser Leu Ile Phe
 915 920 925

Arg Asn Val Trp Leu Tyr Asn Gln Ile Ala Leu Gln Leu Lys Asn His

930

935

940

Ala Leu Cys Asn Asn Lys Leu Tyr Leu Asp Ile Leu Lys Val Leu Lys
 945 950 955 960

His Leu Lys Thr Phe Phe Asn Leu Asp Asn Ile Asp Thr Ala Leu Thr
 965 970 975

Leu Tyr Met Asn Leu Pro Met Leu Phe Gly Gly Gly Asp Pro Asn Leu
 980 985 990

Leu Tyr Arg Ser Phe Tyr Arg Arg Thr Pro Asp Phe Leu Thr Glu Ala
 995 1000 1005

Ile Val His Ser Val Phe Ile Leu Ser Tyr Tyr Thr Asn His Asp
 1010 1015 1020

Leu Lys Asp Lys Leu Gln Asp Leu Ser Asp Asp Arg Leu Asn Lys
 1025 1030 1035

Phe Leu Thr Cys Ile Ile Thr Phe Asp Lys Asn Pro Asn Ala Glu
 1040 1045 1050

Phe Val Thr Leu Met Arg Asp Pro Gln Ala Leu Gly Ser Glu Arg
 1055 1060 1065

Gln Ala Lys Ile Thr Ser Glu Ile Asn Arg Leu Ala Val Thr Glu
 1070 1075 1080

Val Leu Ser Thr Ala Pro Asn Lys Ile Phe Ser Lys Ser Ala Gln
 1085 1090 1095

His Tyr Thr Thr Glu Ile Asp Leu Asn Asp Ile Met Gln Asn
 1100 1105 1110

Ile Glu Pro Thr Tyr Pro His Gly Leu Arg Val Val Tyr Glu Ser
 1115 1120 1125

Leu Pro Phe Tyr Lys Ala Glu Lys Ile Val Asn Leu Ile Ser Gly
 1130 1135 1140

Thr Lys Ser Ile Thr Asn Ile Leu Glu Lys Thr Ser Ala Ile Asp
 1145 1150 1155

Leu Thr Asp Ile Asp Arg Ala Thr Glu Met Met Arg Lys Asn Ile

1160

1165

1170

Thr Leu Leu Ile Arg Ile Leu Pro Leu Asp Cys Asn Arg Asp Lys
 1175 1180 1185

Arg Glu Ile Leu Ser Met Glu Asn Leu Ser Ile Thr Glu Leu Ser
 1190 1195 1200

Lys Tyr Val Arg Glu Arg Ser Trp Ser Leu Ser Asn Ile Val Gly
 1205 1210 1215

Val Thr Ser Pro Ser Ile Met Tyr Thr Met Asp Ile Lys Tyr Thr
 1220 1225 1230

Thr Ser Thr Ile Ser Ser Gly Ile Ile Ile Glu Lys Tyr Asn Val
 1235 1240 1245

Asn Ser Leu Thr Arg Gly Glu Arg Gly Pro Thr Lys Pro Trp Val
 1250 1255 1260

Gly Ser Ser Thr Gln Glu Lys Lys Thr Met Pro Val Tyr Asn Arg
 1265 1270 1275

Gln Val Leu Thr Lys Lys Gln Arg Asp Gln Ile Asp Leu Leu Ala
 1280 1285 1290

Lys Leu Asp Trp Val Tyr Ala Ser Ile Asp Asn Lys Asp Glu Phe
 1295 1300 1305

Met Glu Glu Leu Ser Ile Gly Thr Leu Gly Leu Thr Tyr Glu Lys
 1310 1315 1320

Ala Lys Lys Leu Phe Pro Gln Tyr Leu Ser Val Asn Tyr Leu His
 1325 1330 1335

Arg Leu Thr Val Ser Ser Arg Pro Cys Glu Phe Pro Ala Ser Ile
 1340 1345 1350

Pro Ala Tyr Arg Thr Thr Asn Tyr His Phe Asp Thr Ser Pro Ile
 1355 1360 1365

Asn Arg Ile Leu Thr Glu Lys Tyr Gly Asp Glu Asp Ile Asp Ile
 1370 1375 1380

Val Phe Gln Asn Cys Ile Ser Phe Gly Leu Ser Leu Met Ser Val

1385

1390

1395

Val Glu Gln Phe Thr Asn Val Cys Pro Asn Arg Ile Ile Leu Ile
 1400 1405 1410

Pro Lys Leu Asn Glu Ile His Leu Met Lys Pro Pro Ile Phe Thr
 1415 1420 1425

Gly Asp Val Asp Ile His Lys Leu Lys Gln Val Ile Gln Lys Gln
 1430 1435 1440

His Met Phe Leu Pro Asp Lys Ile Ser Leu Thr Gln Tyr Val Glu
 1445 1450 1455

Leu Phe Leu Ser Asn Lys Thr Leu Lys Ser Gly Ser His Val Asn
 1460 1465 1470

Ser Asn Leu Ile Leu Ala His Lys Ile Ser Asp Tyr Phe His Asn
 1475 1480 1485

Thr Tyr Ile Leu Ser Thr Asn Leu Ala Gly His Trp Ile Leu Ile
 1490 1495 1500

Ile Gln Leu Met Lys Asp Ser Lys Gly Ile Phe Glu Lys Asp Trp
 1505 1510 1515

Gly Glu Gly Tyr Ile Thr Asp His Met Phe Ile Asn Leu Lys Val
 1520 1525 1530

Phe Phe Asn Ala Tyr Lys Thr Tyr Leu Leu Cys Phe His Lys Gly
 1535 1540 1545

Tyr Gly Lys Ala Lys Leu Glu Cys Asp Met Asn Thr Ser Asp Leu
 1550 1555 1560

Leu Cys Val Leu Glu Leu Ile Asp Ser Ser Tyr Trp Lys Ser Met
 1565 1570 1575

Ser Lys Val Phe Leu Glu Gln Lys Val Ile Lys Tyr Ile Leu Ser
 1580 1585 1590

Gln Asp Ala Ser Leu His Arg Val Lys Gly Cys His Ser Phe Lys
 1595 1600 1605

Leu Trp Phe Leu Lys Arg Leu Asn Val Ala Glu Phe Thr Val Cys

1610

1615

1620

Pro Trp Val Val Asn Ile Asp Tyr His Pro Thr His Met Lys Ala
1625 1630 1635

Ile Leu Thr Tyr Ile Asp Leu Val Arg Met Gly Leu Ile Asn Ile
1640 1645 1650

Asp Arg Ile His Ile Lys Asn Lys His Lys Phe Asn Asp Glu Phe
1655 1660 1665

Tyr Thr Ser Asn Leu Phe Tyr Ile Asn Tyr Asn Phe Ser Asp Asn
1670 1675 1680

Thr His Leu Leu Thr Lys His Ile Arg Ile Ala Asn Ser Glu Leu
1685 1690 1695

Glu Asn Asn Tyr Asn Lys Leu Tyr His Pro Thr Pro Glu Thr Leu
1700 1705 1710

Glu Asn Ile Leu Ala Asn Pro Ile Lys Ser Asn Asp Lys Lys Thr
1715 1720 1725

Leu Asn Asp Tyr Cys Ile Gly Lys Asn Val Asp Ser Ile Met Leu
1730 1735 1740

Pro Leu Leu Ser Asn Lys Lys Leu Ile Lys Ser Ser Ala Met Ile
1745 1750 1755

Arg Thr Asn Tyr Ser Lys Gln Asp Leu Tyr Asn Leu Phe Pro Met
1760 1765 1770

Val Val Ile Asp Arg Ile Ile Asp His Ser Gly Asn Thr Ala Lys
1775 1780 1785

Ser Asn Gln Leu Tyr Thr Thr Ser His Gln Ile Ser Leu Val
1790 1795 1800

His Asn Ser Thr Ser Leu Tyr Cys Met Leu Pro Trp His His Ile
1805 1810 1815

Asn Arg Phe Asn Phe Val Phe Ser Ser Thr Gly Cys Lys Ile Ser
1820 1825 1830

Ile Glu Tyr Ile Leu Lys Asp Leu Lys Ile Lys Asp Pro Asn Cys

1835

1840

1845

Ile Ala Phe Ile Gly Glu Gly Ala Gly Asn Leu Leu Leu Arg Thr
1850 1855 1860

Val Val Glu Leu His Pro Asp Ile Arg Tyr Ile Tyr Arg Ser Leu
1865 1870 1875

Lys Asp Cys Asn Asp His Ser Leu Pro Ile Glu Phe Leu Arg Leu
1880 1885 1890

Tyr Asn Gly His Ile Asn Ile Asp Tyr Gly Glu Asn Leu Thr Ile
1895 1900 1905

Pro Ala Thr Asp Ala Thr Asn Asn Ile His Trp Ser Tyr Leu His
1910 1915 1920

Ile Lys Phe Ala Glu Pro Ile Ser Leu Phe Val Cys Asp Ala Glu
1925 1930 1935

Leu Ser Val Thr Val Asn Trp Ser Lys Ile Ile Ile Glu Trp Ser
1940 1945 1950

Lys His Val Arg Lys Cys Lys Tyr Cys Ser Ser Val Asn Lys Cys
1955 1960 1965

Met Leu Ile Val Lys Tyr His Ala Gln Asp Asp Ile Asp Phe Lys
1970 1975 1980

Leu Asp Asn Ile Thr Ile Leu Lys Thr Tyr Val Cys Leu Gly Ser
1985 1990 1995

Lys Leu Lys Gly Ser Glu Val Tyr Leu Val Leu Thr Ile Gly Pro
2000 2005 2010

Ala Asn Ile Phe Pro Val Phe Asn Val Val Gln Asn Ala Lys Leu
2015 2020 2025

Ile Leu Ser Arg Thr Lys Asn Phe Ile Met Pro Lys Lys Ala Asp
2030 2035 2040

Lys Glu Ser Ile Asp Ala Asn Ile Lys Ser Leu Ile Pro Phe Leu
2045 2050 2055

Cys Tyr Pro Ile Thr Lys Lys Gly Ile Asn Thr Ala Leu Ser Lys

2060

2065

2070

Leu Lys Ser Val Val Ser Gly Asp Ile Leu Ser Tyr Ser Ile Ala
2075 2080 2085

Gly Arg Asn Glu Val Phe Ser Asn Lys Leu Ile Asn His Lys His
2090 2095 2100

Met Asn Ile Leu Lys Trp Phe Asn His Val Leu Asn Phe Arg Ser
2105 2110 2115

Thr Glu Leu Asn Tyr Asn His Leu Tyr Met Val Glu Ser Thr Tyr
2120 2125 2130

Pro Tyr Leu Ser Glu Leu Leu Asn Ser Leu Thr Thr Asn Glu Leu
2135 2140 2145

Lys Lys Leu Ile Lys Ile Thr Gly Ser Leu Leu Tyr Asn Phe His
2150 2155 2160

Asn Glu
2165

<210> 14
<211> 2233
<212> PRT
<213> human parainfluenza virus 3

<400> 14

Met Asp Thr Glu Ser Asn Asn Gly Thr Val Ser Asp Ile Leu Tyr Pro
1 5 10 15

Glu Cys His Leu Asn Ser Pro Ile Val Lys Gly Lys Ile Ala Gln Leu
20 25 30

His Thr Ile Met Ser Leu Pro Gln Pro Tyr Asp Met Asp Asp Asp Ser
35 40 45

Ile Leu Val Ile Thr Arg Gln Lys Ile Lys Leu Asn Lys Leu Asp Lys
50 55 60

Arg Gln Arg Ser Ile Arg Arg Leu Lys Leu Ile Leu Thr Glu Lys Val
65 70 75 80

Asn Asp Leu Gly Lys Tyr Thr Phe Ile Arg Tyr Pro Glu Met Ser Lys
85 90 95

Glu Met Phe Lys Leu His Ile Pro Gly Ile Asn Ser Lys Val Thr Glu
100 105 110

Leu Leu Leu Lys Ala Asp Arg Thr Tyr Ser Gln Met Thr Asp Gly Leu
115 120 125

Arg Asp Leu Trp Ile Asn Val Leu Ser Lys Leu Ala Ser Lys Asn Asp
130 135 140

Gly Ser Asn Tyr Asp Leu Asn Glu Glu Ile Asn Asn Ile Ser Lys Val
145 150 155 160

His Thr Thr Tyr Lys Ser Asp Lys Trp Tyr Asn Pro Phe Lys Thr Trp
165 170 175

Phe Thr Ile Lys Tyr Asp Met Arg Arg Leu Gln Lys Ala Arg Asn Glu
180 185 190

Val Thr Phe Asn Met Gly Lys Asp Tyr Asn Leu Leu Glu Asp Gln Lys
195 200 205

Asn Phe Leu Leu Ile His Pro Glu Leu Val Leu Ile Leu Asp Lys Gln
210 215 220

Asn Tyr Asn Gly Tyr Leu Ile Thr Pro Glu Leu Val Leu Pro Tyr Cys
225 230 235 240

Asp Val Val Glu Gly Arg Trp Asn Ile Ser Ala Cys Ala Lys Leu Asp
245 250 255

Pro Lys Leu Gln Ser Met Tyr Gln Lys Gly Asn Asn Leu Trp Glu Val
260 265 270

Ile Asp Lys Leu Phe Pro Ile Met Gly Glu Lys Thr Phe Asp Val Ile
275 280 285

Ser Leu Leu Glu Pro Leu Ala Leu Ser Leu Ile Gln Thr His Asp Pro
290 295 300

Val Lys Gln Leu Arg Gly Ala Phe Leu Asn His Val Leu Ser Glu Met
305 310 315 320

Glu Leu Ile Phe Glu Ser Arg Glu Ser Ile Lys Glu Phe Leu Ser Val
325 330 335

Asp Tyr Ile Asp Lys Ile Leu Asp Ile Phe Asn Lys Ser Thr Ile Asp
340 345 350

Glu Ile Ala Glu Ile Phe Ser Phe Phe Arg Thr Phe Gly His Pro Pro
355 360 365

Leu Glu Ala Ser Ile Ala Ala Glu Lys Val Arg Lys Tyr Met Tyr Ile
370 375 380

Gly Lys Gln Leu Lys Phe Asp Thr Ile Asn Lys Cys His Ala Ile Phe
385 390 395 400

Cys Thr Ile Ile Ile Asn Gly Tyr Arg Glu Arg His Gly Gln Trp
405 410 415

Pro Pro Val Thr Leu Pro Asp His Ala His Glu Phe Ile Ile Asn Ala
420 425 430

Tyr Gly Ser Asn Ser Ala Ile Ser Tyr Glu Asn Ala Val Asp Tyr Tyr
435 440 445

Gln Ser Phe Ile Gly Ile Lys Phe Asn Lys Phe Ile Glu Pro Gln Leu
450 455 460

Asp Glu Asp Leu Thr Ile Tyr Met Lys Asp Lys Ala Leu Ser Pro Lys
465 470 475 480

Lys Ser Asn Trp Asp Thr Val Ser Pro Ala Ser Asn Leu Leu Tyr Arg
485 490 495

Thr Asn Ala Ser Asn Glu Ser Arg Arg Leu Val Glu Lys Phe Ile Ala
500 505 510

Asp Ser Lys Phe Asp Pro Asn Gln Ile Leu Asp Tyr Val Glu Ser Gly
515 520 525

Asp Trp Leu Asp Asp Pro Glu Phe Asn Ile Ser Tyr Ser Leu Lys Glu
530 535 540

Lys Glu Ile Lys Gln Glu Gly Arg Leu Phe Ala Lys Met Thr Tyr Lys
545 550 555 560

Met Arg Ala Thr Gln Val Leu Ser Glu Thr Leu Leu Ala Asn Asn Ile
565 570 575

Gly Lys Phe Phe Gln Glu Asn Gly Met Val Lys Gly Glu Ile Glu Leu
580 585 590

Leu Lys Arg Leu Thr Thr Ile Ser Ile Ser Gly Val Pro Arg Tyr Asn
595 600 605

Glu Val Tyr Asn Asn Ser Lys Ser His Thr Asp Asp Leu Lys Thr Tyr
610 615 620

Asn Lys Ile Ser Asn Leu Asn Leu Ser Ser Asn Gln Lys Ser Lys Lys
625 630 635 640

Phe Glu Phe Lys Ser Thr Asp Ile Tyr Asn Asp Gly Tyr Glu Thr Val
645 650 655

Ser Cys Phe Leu Thr Thr Asp Leu Lys Lys Tyr Cys Leu Asn Trp Arg
660 665 670

Tyr Glu Ser Thr Ala Leu Phe Gly Glu Thr Cys Asn Gln Ile Phe Gly
675 680 685

Leu Asn Lys Leu Phe Asn Trp Leu His Pro Arg Leu Glu Gly Ser Thr
690 695 700

Ile Tyr Val Gly Asp Pro Tyr Cys Pro Pro Ser Asp Lys Glu His Ile
705 710 715 720

Ser Leu Glu Asp His Pro Asp Ser Gly Phe Tyr Val His Asn Pro Arg
725 730 735

Gly Gly Ile Glu Gly Phe Cys Gln Lys Leu Trp Thr Leu Ile Ser Ile
740 745 750

Ser Ala Ile His Leu Ala Ala Val Arg Ile Gly Val Arg Val Thr Ala
755 760 765

Met Val Gln Gly Asp Asn Gln Ala Ile Ala Val Thr Thr Arg Val Pro
770 775 780

Asn Asn Tyr Asp Tyr Arg Val Lys Lys Glu Ile Val Tyr Lys Asp Val
785 790 795 800

Val Arg Phe Phe Asp Ser Leu Arg Glu Val Met Asp Asp Leu Gly His
805 810 815

Glu Leu Lys Leu Asn Glu Thr Ile Ile Ser Ser Lys Met Phe Ile Tyr
820 825 830

Ser Lys Arg Ile Tyr Tyr Asp Gly Arg Ile Leu Pro Gln Ala Leu Lys
835 840 845

Ala Leu Ser Arg Cys Val Phe Trp Ser Glu Thr Val Ile Asp Glu Thr
850 855 860

Arg Ser Ala Ser Ser Asn Leu Ala Thr Ser Phe Ala Lys Ala Ile Glu
865 870 875 880

Asn Gly Tyr Ser Pro Val Leu Gly Tyr Ala Cys Ser Ile Phe Lys Asn
885 890 895

Ile Gln Gln Leu Tyr Ile Ala Leu Gly Met Asn Ile Asn Pro Thr Ile
900 905 910

Thr Gln Asn Ile Lys Asp Leu Tyr Phe Arg Asn Pro Asn Trp Met Gln
915 920 925

Tyr Ala Ser Leu Ile Pro Ala Ser Val Gly Gly Phe Asn Tyr Met Ala
930 935 940

Met Ser Arg Cys Phe Val Arg Asn Ile Gly Asp Pro Ser Val Ala Ala
945 950 955 960

Leu Ala Asp Ile Lys Arg Phe Ile Lys Ala Asn Leu Leu Asp Arg Ser
965 970 975

Val Leu Tyr Arg Ile Met Asn Gln Glu Pro Gly Glu Ser Ser Phe Leu
980 985 990

Asp Trp Ala Ser Asp Pro Tyr Ser Cys Asn Leu Pro Gln Ser Gln Asn
995 1000 1005

Ile Thr Thr Met Ile Lys Asn Ile Thr Ala Arg Asn Val Leu Gln
1010 1015 1020

Asp Ser Pro Asn Pro Leu Leu Ser Gly Leu Phe Thr Asn Thr Met
1025 1030 1035

Ile Glu Glu Asp Glu Glu Leu Ala Glu Phe Leu Met Asp Arg Lys
1040 1045 1050

Val Ile Leu Pro Arg Val Ala His Asp Ile Leu Asp Asn Ser Leu
1055 1060 1065

Thr Gly Ile Arg Asn Ala Ile Ala Gly Met Leu Asp Thr Thr Lys
1070 1075 1080

Ser Leu Ile Arg Val Gly Ile Asn Arg Gly Gly Leu Thr Tyr Ser
1085 1090 1095

Leu Leu Arg Lys Ile Ser Asn Tyr Asp Leu Val Gln Tyr Glu Thr
1100 1105 1110

Leu Ser Arg Thr Leu Arg Leu Ile Val Ser Asp Lys Ile Arg Tyr
1115 1120 1125

Glu Asp Met Cys Ser Val Asp Leu Ala Ile Ala Leu Arg Gln Lys
1130 1135 1140

Met Trp Ile His Leu Ser Gly Gly Arg Met Ile Ser Gly Leu Glu
1145 1150 1155

Thr Pro Asp Pro Leu Glu Leu Leu Ser Gly Val Ile Ile Thr Gly
1160 1165 1170

Ser Glu His Cys Lys Ile Cys Tyr Ser Ser Asp Gly Thr Asn Pro
1175 1180 1185

Tyr Thr Trp Met Tyr Leu Pro Gly Asn Ile Lys Ile Gly Ser Ala
1190 1195 1200

Glu Thr Gly Ile Ser Ser Leu Arg Val Pro Tyr Phe Gly Ser Val
1205 1210 1215

Thr Asp Glu Arg Ser Glu Ala Gln Leu Gly Tyr Ile Lys Asn Leu
1220 1225 1230

Ser Lys Pro Ala Lys Ala Ala Ile Arg Ile Ala Met Ile Tyr Thr
1235 1240 1245

Trp Ala Phe Gly Asn Asp Glu Ile Ser Trp Met Glu Ala Ser Gln
1250 1255 1260

Ile Ala Gln Thr Arg Ala Asn Phe Thr Leu Asp Ser Leu Lys Ile
1265 1270 1275

Leu Thr Pro Val Ala Thr Ser Thr Asn Leu Ser His Arg Leu Lys
1280 1285 1290

Asp Thr Ala Thr Gln Met Lys Phe Ser Ser Thr Ser Leu Ile Arg
1295 1300 1305

Val Ser Arg Phe Ile Thr Met Ser Asn Asp Asn Met Ser Ile Lys
1310 1315 1320

Glu Ala Asn Glu Thr Lys Asp Thr Asn Leu Ile Tyr Gln Gln Ile
1325 1330 1335

Met Leu Thr Gly Leu Ser Val Phe Glu Tyr Leu Phe Arg Leu Glu
1340 1345 1350

Glu Thr Thr Gly His Asn Pro Ile Val Met His Leu His Ile Glu
1355 1360 1365

Asp Glu Cys Cys Ile Lys Glu Ser Phe Asn Asp Glu His Ile Asn
1370 1375 1380

Pro Glu Ser Thr Leu Glu Leu Ile Arg Tyr Pro Glu Ser Asn Glu
1385 1390 1395

Phe Ile Tyr Asp Lys Asp Pro Leu Lys Asp Val Asp Leu Ser Lys
1400 1405 1410

Leu Met Val Ile Lys Asp His Ser Tyr Thr Ile Asp Met Asn Tyr
1415 1420 1425

Trp Asp Asp Thr Asp Ile Ile His Ala Ile Ser Ile Cys Thr Ala
1430 1435 1440

Ile Thr Ile Ala Asp Thr Met Ser Gln Leu Asp Arg Asp Asn Leu
1445 1450 1455

Lys Glu Ile Ile Val Ile Ala Asn Asp Asp Asp Ile Asn Ser Leu
1460 1465 1470

Ile Thr Glu Phe Leu Thr Leu Asp Ile Leu Val Phe Leu Lys Thr
1475 1480 1485

Phe Gly Gly Leu Leu Val Asn Gln Phe Ala Tyr Thr Leu Tyr Ser
1490 1495 1500

Leu Lys Thr Glu Gly Arg Asp Leu Ile Trp Asp Tyr Ile Met Arg
1505 1510 1515

Thr Leu Arg Asp Thr Ser His Ser Ile Leu Lys Val Leu Ser Asn
1520 1525 1530

Ala Leu Ser His Pro Lys Val Phe Lys Arg Phe Trp Asp Cys Gly
1535 1540 1545

Val Leu Asn Pro Ile Tyr Gly Pro Asn Thr Ala Ser Gln Asp Gln
1550 1555 1560

Ile Lys Leu Ala Leu Ser Ile Cys Glu Tyr Ser Leu Asp Leu Phe
1565 1570 1575

Met Arg Glu Trp Leu Asn Gly Val Ser Leu Glu Ile Tyr Ile Cys
1580 1585 1590

Asp Ser Asp Met Glu Val Ala Asn Asp Arg Lys Gln Ala Phe Ile
1595 1600 1605

Ser Arg His Leu Ser Phe Val Cys Cys Leu Ala Glu Ile Ala Ser
1610 1615 1620

Phe Gly Pro Asn Leu Leu Asn Leu Thr Tyr Leu Glu Arg Leu Asp
1625 1630 1635

Leu Leu Lys Gln Tyr Leu Glu Leu Asn Ile Lys Asp Asp Pro Thr
1640 1645 1650

Leu Lys Tyr Val Gln Ile Ser Gly Leu Leu Ile Lys Ser Phe Pro
1655 1660 1665

Ser Thr Val Thr Tyr Val Arg Lys Thr Ala Ile Lys Tyr Leu Arg
1670 1675 1680

Ile Arg Gly Ile Ser Pro Pro Glu Val Ile Asp Asp Trp Asp Pro
1685 1690 1695

Ile Glu Asp Glu Asn Met Leu Asp Asn Ile Val Lys Thr Ile Asn
1700 1705 1710

Asp Asn Cys Asn Lys Asp Asn Lys Gly Asn Lys Ile Asn Asn Phe
1715 1720 1725

Trp Gly Leu Ala Leu Lys Asn Tyr Gln Val Leu Lys Ile Arg Ser
1730 1735 1740

Ile Thr Ser Asp Ser Asp Asn Asn Asp Arg Ser Asp Ala Ser Thr
1745 1750 1755

Gly Gly Leu Thr Leu Pro Gln Gly Gly Asn Tyr Leu Ser His Gln
1760 1765 1770

Leu Arg Leu Phe Gly Ile Asn Ser Thr Ser Cys Leu Lys Ala Leu
1775 1780 1785

Glu Leu Ser Gln Ile Leu Met Lys Glu Val Asn Lys Asp Gln Asp
1790 1795 1800

Arg Leu Phe Leu Gly Glu Gly Ala Gly Ala Met Leu Ala Cys Tyr
1805 1810 1815

Asp Ala Thr Leu Gly Pro Ala Val Asn Tyr Tyr Asn Ser Gly Leu
1820 1825 1830

Asn Ile Thr Asp Val Ile Gly Gln Arg Glu Leu Lys Ile Phe Pro
1835 1840 1845

Ser Glu Val Ser Leu Val Gly Lys Lys Leu Gly Asn Val Thr Gln
1850 1855 1860

Ile Leu Asn Arg Val Lys Val Leu Phe Asn Gly Asn Pro Asn Ser
1865 1870 1875

Thr Trp Ile Gly Asn Met Glu Cys Glu Thr Leu Ile Trp Ser Glu
1880 1885 1890

Leu Asn Asp Lys Ser Ile Gly Leu Val His Cys Asp Met Glu Gly
1895 1900 1905

Ala Ile Gly Lys Ser Glu Glu Thr Val Leu His Glu His Tyr Ser
1910 1915 1920

Val Ile Arg Ile Thr Tyr Leu Ile Gly Asp Asp Asp Val Val Leu
1925 1930 1935

Ile Ser Lys Ile Ile Pro Thr Ile Thr Pro Asn Trp Ser Arg Ile
1940 1945 1950

Leu Tyr Leu Tyr Lys Leu Tyr Trp Lys Asp Val Ser Ile Ile Ser
1955 1960 1965

Leu Lys Thr Ser Asn Pro Ala Ser Thr Glu Leu Tyr Leu Ile Ser
1970 1975 1980

Lys Asp Ala Tyr Cys Thr Ile Met Glu Pro Ser Glu Val Val Leu
1985 1990 1995

Ser Lys Leu Lys Arg Leu Ser Leu Leu Glu Glu Asn Asn Leu Leu
2000 2005 2010

Lys Trp Ile Ile Leu Ser Lys Lys Lys Asn Asn Glu Trp Leu His
2015 2020 2025

His Glu Ile Lys Glu Gly Glu Arg Asp Tyr Gly Val Met Arg Pro
2030 2035 2040

Tyr His Met Ala Leu Gln Ile Phe Gly Phe Gln Ile Asn Leu Asn
2045 2050 2055

His Leu Ala Lys Glu Phe Leu Ser Thr Pro Asp Leu Thr Asn Ile
2060 2065 2070

Asn Asn Ile Ile Gln Ser Phe Gln Arg Thr Ile Lys Asp Val Leu
2075 2080 2085

Phe Glu Trp Ile Asn Ile Thr His Asp Gly Lys Arg His Lys Leu
2090 2095 2100

Gly Gly Arg Tyr Asn Ile Phe Pro Leu Lys Asn Lys Gly Lys Leu
2105 2110 2115

Arg Leu Leu Ser Arg Arg Leu Val Leu Ser Trp Ile Ser Leu Ser
2120 2125 2130

Leu Ser Thr Arg Leu Leu Thr Gly Arg Phe Pro Asp Glu Lys Phe
2135 2140 2145

Glu His Arg Ala Gln Thr Gly Tyr Val Ser Leu Pro Asp Thr Asp
2150 2155 2160

Leu Glu Ser Leu Lys Leu Leu Ser Lys Asn Thr Ile Lys Asn Tyr
2165 2170 2175

Arg Glu Cys Ile Gly Ser Ile Ser Tyr Trp Phe Leu Thr Lys Glu
2180 2185 2190

Val Lys Ile Leu Met Lys Leu Ile Gly Gly Ala Lys Leu Leu Gly
2195 2200 2205

Ile Pro Arg Gln Tyr Lys Glu Pro Glu Glu Gln Leu Leu Glu Asp
2210 2215 2220

Tyr Asn Gln His Asp Glu Phe Asp Ile Asp
2225 2230

<210> 15

<211> 2223

<212> PRT

<213> human parainfluenza virus 1

<400> 15

Met Asp Lys Gln Glu Ser Thr Gln Asn Ser Ser Asp Ile Leu Tyr Pro
1 5 10 15

Glu Cys His Leu Asn Ser Pro Ile Val Lys Ser Lys Ile Ala Gln Leu
20 25 30

His Val Leu Leu Asp Ile Asn Gln Pro Tyr Asp Leu Lys Asp Asn Ser
35 40 45

Ile Ile Asn Ile Thr Lys Tyr Lys Ile Arg Asn Gly Gly Leu Ser Pro
50 55 60

Arg Gln Ile Lys Ile Arg Ser Leu Gly Lys Ile Leu Lys Gln Glu Ile
65 70 75 80

Lys Asp Ile Asp Arg Tyr Thr Phe Glu Pro Tyr Pro Ile Phe Ser Leu
85 90 95

Glu Leu Leu Arg Leu Asp Ile Pro Glu Ile Cys Asp Lys Ile Arg Ser
100 105 110

Ile Phe Ser Val Ser Asp Arg Leu Ile Arg Glu Leu Ser Ser Gly Phe
115 120 125

Gln Glu Leu Trp Leu Asn Ile Leu Arg Gln Leu Gly Cys Val Glu Gly
130 135 140

Lys Glu Gly Phe Asp Ser Leu Lys Asp Val Asp Ile Ile Pro Asp Ile
145 150 155 160

Thr Asp Lys Tyr Asn Lys Asn Thr Trp Tyr Arg Pro Phe Leu Thr Trp
165 170 175

Phe Ser Ile Lys Tyr Asp Met Arg Trp Met Gln Lys Asn Lys Ser Gly
180 185 190

Asn His Leu Asp Val Ser Asn Ser His Asn Phe Leu Asp Cys Lys Ser
195 200 205

Tyr Ile Leu Ile Ile Tyr Arg Asp Leu Val Ile Ile Ile Asn Lys Leu
210 215 220

Lys Leu Thr Gly Tyr Val Leu Thr Pro Glu Leu Val Leu Met Tyr Cys
225 230 235 240

Asp Val Val Glu Gly Arg Trp Asn Met Ser Ser Ala Gly Arg Leu Asp
245 250 255

Lys Arg Ser Ser Lys Ile Thr Cys Lys Gly Glu Glu Leu Trp Glu Leu
260 265 270

Ile Asp Ser Leu Phe Pro Asn Leu Gly Glu Asp Val Tyr Asn Ile Ile
275 280 285

Ser Leu Leu Glu Pro Leu Ser Leu Ala Leu Ile Gln Leu Asp Asp Pro
290 295 300

Val Thr Asn Leu Lys Gly Ala Phe Met Arg His Val Leu Thr Glu Leu
305 310 315 320

His Thr Ile Leu Ile Lys Asp Asn Ile Tyr Thr Asp Ser Glu Ala Asp
325 330 335

Ser Ile Met Glu Ser Leu Ile Lys Ile Phe Arg Glu Thr Ser Ile Asp
340 345 350

Glu Lys Ala Glu Ile Phe Ser Phe Phe Arg Thr Phe Gly His Pro Ser
355 360 365

Leu Glu Ala Ile Thr Ala Ala Asp Lys Val Arg Thr His Met Tyr Ser
370 375 380

Ser Lys Lys Ile Ile Leu Lys Thr Leu Tyr Glu Cys His Ala Ile Phe
385 390 395 400

Cys Ala Ile Ile Ile Asn Gly Tyr Arg Glu Arg His Gly Gly Gln Trp
405 410 415

Pro Pro Cys Glu Phe Pro Asn His Val Cys Leu Glu Leu Lys Asn Ala
420 425 430

Gln Gly Ser Asn Ser Ala Ile Ser Tyr Glu Cys Ala Val Asp Asn Tyr
435 440 445

Ser Ser Phe Ile Gly Phe Lys Phe Leu Lys Phe Ile Glu Pro Gln Leu
450 455 460

Asp Glu Asp Leu Thr Ile Tyr Met Lys Asp Lys Ala Leu Ser Pro Arg
465 470 475 480

-- Lys Ala Ala Trp Asp Ser Val Tyr Pro Asp Ser Asn Leu Tyr Tyr Lys
485 490 495

Val Pro Glu Ser Glu Glu Thr Arg Arg Leu Ile Glu Val Phe Ile Asn
500 505 510

Asp Asn Asn Phe Asn Pro Ala Asp Ile Ile Asn Tyr Val Glu Ser Gly
515 520 525

Glu Trp Leu Asn Asp Asp Ser Phe Asn Ile Ser Tyr Ser Leu Lys Glu
530 535 540

Lys Glu Ile Lys Gln Glu Gly Arg Leu Phe Ala Lys Met Thr Tyr Lys
545 550 555 560

Met Arg Ala Val Gln Val Leu Ala Glu Thr Leu Leu Ala Lys Gly Val
565 570 575

Gly Glu Leu Phe Ser Glu Asn Gly Met Val Lys Gly Glu Ile Asp Leu
580 585 590

Leu Lys Arg Leu Thr Thr Leu Ser Val Ser Gly Val Pro Arg Ser Asn
595 600 605

Ser Val Tyr Asn Asn Pro Ile Leu His Glu Lys Leu Ile Lys Asn Met
610 615 620

Asn Lys Cys Asn Ser Asn Gly Tyr Trp Asp Glu Arg Lys Lys Ser Lys
625 630 635 640

Asn Glu Phe Lys Ala Ala Asp Ser Ser Thr Glu Gly Tyr Glu Thr Leu
645 650 655

Ser Cys Phe Leu Thr Thr Asp Leu Lys Lys Tyr Cys Leu Asn Trp Arg
660 665 670

Phe Glu Ser Thr Ala Leu Phe Gly Gln Arg Cys Asn Glu Ile Phe Gly
675 680 685

Phe Lys Thr Phe Phe Asn Trp Met His Pro Ile Leu Glu Lys Ser Thr
690 695 700

Ile Tyr Val Gly Asp Pro Tyr Cys Pro Val Pro Asp Arg Met His Lys
705 710 715 720

Glu Leu Gln Asp His-Asp-Asp Thr-Gly Ile Phe Ile His Asn Pro Arg
725 730 735

Gly Gly Ile Glu Gly Tyr Cys Gln Lys Leu Trp Thr Leu Ile Ser Ile
740 745 750

Ser Ala Ile His Leu Ala Ala Val Lys Val Gly Val Arg Val Ser Ala
755 760 765

Met Val Gln Gly Asp Asn Gln Ala Ile Ala Val Thr Ser Arg Val Pro
770 775 780

Val Thr Gln Thr Tyr Lys Gln Lys Lys Thr His Val Tyr Glu Glu Ile
785 790 795 800

Thr Arg Tyr Phe Gly Ala Leu Arg Glu Val Met Phe Asp Ile Gly His
805 810 815

Glu Leu Lys Leu Asn Glu Thr Ile Ile Ser Ser Lys Met Phe Val Tyr
820 825 830

Ser Lys Arg Ile Tyr Tyr Asp Gly Lys Ile Leu Pro Gln Cys Leu Lys
835 840 845

Ala Leu Thr Arg Cys Val Phe Trp Ser Glu Thr Leu Val Asp Glu Asn
850 855 860

Arg Ser Ala Cys Ser Asn Ile Ala Thr Ser Ile Ala Lys Ala Ile Glu
865 870 875 880

Asn Gly Tyr Ser Pro Ile Leu Gly Tyr Cys Ile Ala Leu Phe Lys Thr
885 890 895

Cys Gln Gln Val Cys Ile Ser Leu Gly Met Thr Ile Asn Pro Thr Ile
900 905 910

Thr Ser Thr Ile Lys Asp Gln Tyr Phe Lys Gly Lys Asn Trp Leu Arg
915 920 925

Cys Ala Ile Leu Ile Pro Ala Asn Ile Gly Gly Phe Asn Tyr Met Ser
930 935 940

Thr Ala Arg Cys Phe Val Arg Asn Ile Gly Asp Pro Ala Val Ala Ala
945 950 955 960

Leu Ala Asp Leu Lys Arg Phe Ile Lys Ala Gly Leu Leu Asp Lys Gln
965 970 975

Val Leu Tyr Arg Val Met Asn Gln Glu Pro Gly Asp Ser Ser Phe Leu
980 985 990

Asp Trp Ala Ser Asp Pro Tyr Ser Cys Asn Leu Pro His Ser Gln Ser
995 1000 1005

Ile Thr Thr Ile Ile Lys Asn Val Thr Ala Arg Ser Val Leu Gln
1010 1015 1020

Glu Ser Pro Asn Pro Leu Leu Ser Gly Leu Phe Ser Glu Ser Ser
1025 1030 1035

Ser Glu Glu Asp Leu Asn Leu Ala Ser Phe Leu Met Asp Arg Lys
1040 1045 1050

Ala Ile Leu Pro Arg Val Ala His Glu Ile Leu Asp Asn Ser Leu
1055 1060 1065

Thr Gly Val Arg Glu Ala Ile Ala Gly Met Leu Asp Thr Thr Lys
1070 1075 1080

Ser Leu Val Arg Ala Ser Val Arg Arg Gly Gly Leu Ser Tyr Ser
1085 1090 1095

Ile	Leu	Arg	Arg	Leu	Ile	Asn	Tyr	Asp	Leu	Leu	Gln	Tyr	Glu	Thr
1100							1105					1110		
Leu	Thr	Arg	Thr	Leu	Arg	Lys	Pro	Val	Lys	Asp	Asn	Ile	Glu	Tyr
1115							1120					1125		
Glu	Tyr	Met	Cys	Ser	Val	Glu	Leu	Ala	Ile	Gly	Leu	Arg	Gln	Lys
1130							1135					1140		
Met	Trp	Phe	His	Leu	Thr	Tyr	Gly	Arg	Pro	Ile	His	Gly	Leu	Glu
1145							1150					1155		
Thr	Pro	Asp	Pro	Leu	Glu	Leu	Leu	Arg	Gly	Ser	Phe	Ile	Glu	Gly
1160							1165					1170		
Ser	Glu	Ile	Cys	Lys	Phe	Cys	Arg	Ser	Glu	Gly	Asn	Asn	Pro	Met
1175							1180					1185		
Tyr	Thr	Trp	Phe	Tyr	Leu	Pro	Asp	Asn	Ile	Asp	Leu	Asp	Thr	Leu
1190							1195					1200		
Ser	Asn	Gly	Ser	Pro	Ala	Ile	Arg	Ile	Pro	Tyr	Phe	Gly	Ser	Ala
1205							1210					1215		
Thr	Asp	Glu	Arg	Ser	Glu	Ala	Gln	Leu	Gly	Tyr	Val	Lys	Asn	Leu
1220							1225					1230		
Ser	Lys	Pro	Ala	Lys	Ala	Ala	Ile	Arg	Ile	Ala	Met	Val	Tyr	Thr
1235							1240					1245		
Trp	Ala	Tyr	Gly	Thr	Asp	Glu	Ile	Ser	Trp	Met	Glu	Ala	Ala	Leu
1250							1255					1260		
Ile	Ala	Gln	Thr	Arg	Ala	Asn	Leu	Ser	Leu	Glu	Asn	Leu	Lys	Leu
1265							1270					1275		
Leu	Thr	Pro	Val	Ser	Thr	Ser	Thr	Asn	Leu	Ser	His	Arg	Leu	Arg
1280							1285					1290		
Asp	Thr	Ala	Thr	Gln	Met	Lys	Phe	Ser	Ser	Ala	Thr	Leu	Val	Arg
1295							1300					1305		
Ala	Ser	Arg	Phe	Ile	Thr	Ile	Ser	Asn	Asp	Asn	Met	Ala	Leu	Lys
1310							1315					1320		

Glu Ala Gly Glu Ser Lys Asp Thr Asn Leu Val Tyr Gln Gln Ile
1325 1330 1335

Met Leu Thr Gly Leu Ser Leu Phe Glu Phe Asn Met Arg Tyr Lys
1340 1345 1350

Gln Gly Ser Leu Ser Lys Pro Met Ile Leu His Leu His Leu Asn
1355 1360 1365

Asn Lys Cys Cys Ile Ile Glu Ser Pro Gln Glu Leu Asn Ile Pro
1370 1375 1380

Pro Arg Ser Thr Leu Asp Leu Glu Ile Thr Gln Glu Asn Asn Lys
1385 1390 1395

Leu Ile Tyr Asp Pro Asp Pro Leu Lys Asp Ile Asp Leu Glu Leu
1400 1405 1410

Phe Ser Lys Val Arg Asp Val Val His Thr Ile Asp Met Asn Tyr
1415 1420 1425

Trp Ser Asp Asp Glu Ile Ile Arg Ala Thr Ser Ile Cys Thr Ala
1430 1435 1440

Met Thr Ile Ala Asp Thr Met Ser Gln Leu Asp Arg Asp Asn Leu
1445 1450 1455

Lys Glu Met Ile Ala Leu Ile Asn Asp Asp Asp Ile Asn Ser Leu
1460 1465 1470

Ile Thr Glu Phe Met Val Ile Asp Ile Pro Leu Phe Cys Ser Thr
1475 1480 1485

Phe Gly Gly Ile Leu Ile Asn Gln Phe Ala Tyr Ser Leu Tyr Gly
1490 1495 1500

Leu Asn Val Arg Gly Arg Asp Glu Ile Trp Gly Tyr Val Ile Arg
1505 1510 1515

Ile Ile Lys Asp Thr Ser His Ala Val Leu Lys Val Leu Ser Asn
1520 1525 1530

Ala Leu Ser His Pro Lys Ile Phe Lys Arg Phe Trp Asp Ala Gly
1535 1540 1545

Val Val Glu Pro Val Tyr Gly Pro Asn Leu Ser Asn Gln Asp Lys
1550 1555 1560

Ile Leu Leu Ala Ile Ser Val Cys Glu Tyr Ser Val Asp Leu Phe
1565 1570 1575

Met Arg Asp Trp Gln Glu Gly Ile Pro Leu Glu Ile Phe Ile Cys
1580 1585 1590

Asp Asn Asp Pro Asn Ile Ala Glu Met Arg Lys Leu Ser Phe Leu
1595 1600 1605

Ala Arg His Leu Ala Tyr Leu Cys Ser Leu Ala Glu Ile Ala Lys
1610 1615 1620

Glu Gly Pro Lys Leu Glu Ser Met Thr Ser Leu Glu Arg Leu Glu
1625 1630 1635

Ser Leu Lys Glu Tyr Leu Glu Leu Thr Phe Leu Asp Asp Pro Ile
1640 1645 1650

Leu Arg Tyr Ser Gln Leu Thr Gly Leu Val Ile Lys Ile Phe Pro
1655 1660 1665

Ser Thr Leu Thr Tyr Ile Arg Lys Ser Ser Ile Lys Val Leu Arg
1670 1675 1680

Val Arg Gly Ile Gly Ile Pro Glu Val Leu Glu Asp Trp Asp Pro
1685 1690 1695

Asp Ala Asp Ser Met Leu Leu Asp Asn Ile Thr Ala Glu Val Gln
1700 1705 1710

His Asn Ile Pro Leu Lys Lys Asn Glu Arg Thr Pro Phe Trp Gly
1715 1720 1725

Leu Arg Val Ser Lys Ser Gln Val Leu Arg Leu Arg Gly Tyr Glu
1730 1735 1740

Glu Ile Lys Arg Glu Glu Arg Gly Arg Ser Gly Val Gly Leu Thr
1745 1750 1755

Leu Pro Phe Asp Gly Arg Tyr Leu Ser His Gln Leu Arg Leu Phe
1760 1765 1770

Gly Ile Asn Ser Thr Ser Cys Leu Lys Ala Leu Glu Leu Thr Tyr
1775 1780 1785

Leu Leu Asn Pro Leu Val Asn Lys Asp Lys Asp Arg Leu Tyr Leu
1790 1795 1800

Gly Glu Gly Ala Gly Ala Met Leu Ser Cys Tyr Asp Ala Thr Leu
1805 1810 1815

Gly Pro Cys Met Asn Tyr Tyr Asn Ser Gly Val Asn Ser Cys Asp
1820 1825 1830

Leu Asn Gly Gln Arg Glu Leu Asn Ile Tyr Pro Ser Glu Val Ala
1835 1840 1845

Leu Val Gly Lys Lys Leu Asn Asn Val Thr Ser Leu Cys Gln Arg
1850 1855 1860

—Val Lys Val Leu Phe Asn Gly Asn Pro Gly Ser Thr Trp Ile Gly
1865 1870 1875

Asn Asp Glu Cys Glu Thr Leu Ile Trp Asn Glu Leu Gln Asn Asn
1880 1885 1890

Ser Ile Gly Phe Ile His Cys Asp Met Glu Gly Gly Glu His Lys
1895 1900 1905

Cys Asp Gln Val Val Leu His Glu His Tyr Ser Val Ile Arg Ile
1910 1915 1920

Ala Tyr Leu Val Gly Asp Lys Asp Val Ile Leu Val Ser Lys Ile
1925 1930 1935

Ala Pro Arg Leu Gly Thr Asp Trp Thr Lys Gln Leu Ser Leu Tyr
1940 1945 1950

Leu Arg Tyr Trp Arg Asp Val Ser Leu Ile Val Leu Lys Thr Ser
1955 1960 1965

Asn Pro Ala Ser Thr Glu Met Tyr Leu Ile Ser Lys Asp Pro Lys
1970 1975 1980

Ser Asp Ile Ile Glu Asp Ser Asn Thr Val Leu Ala Asn Leu Leu
1985 1990 1995

Pro Leu Ser Lys Glu Asp Ser Ile Lys Ile Glu Lys Trp Ile Leu
2000 2005 2010

Val Glu Lys Ala Lys Val His Asp Trp Ile Val Arg Glu Leu Lys
2015 2020 2025

Glu Gly Ser Ala Ser Ser Gly Met Leu Arg Pro Tyr His Gln Ala
2030 2035 2040

Leu Gln Ile Phe Gly Phe Glu Pro Asn Leu Asn Lys Leu Cys Arg
2045 2050 2055

Asp Phe Leu Ser Thr Leu Asn Ile Val Asp Thr Lys Asn Cys Ile
2060 2065 2070

Ile Thr Phe Asp Arg Val Leu Arg Asp Thr Ile Phe Glu Trp Thr
2075 2080 2085

Arg Ile Lys Asp Ala Asp Lys Lys Leu Arg Leu Thr Gly Lys Tyr
2090 2095 2100

Asp Leu Tyr Pro Leu Arg Asp Ser Gly Lys Leu Lys Val Ile Ser
2105 2110 2115

Arg Arg Leu Val Ile Ser Trp Ile Ala Leu Ser Met Ser Thr Arg
2120 2125 2130

Leu Val Thr Gly Ser Phe Pro Asp Ile Lys Phe Glu Ser Arg Leu
2135 2140 2145

Gln Leu Gly Ile Val Ser Ile Ser Ser Arg Glu Ile Lys Asn Leu
2150 2155 2160

Arg Val Ile Ser Lys Ile Val Ile Asp Lys Phe Glu Asp Ile Ile
2165 2170 2175

His Ser Val Thr Tyr Arg Phe Leu Thr Lys Glu Ile Lys Ile Leu
2180 2185 2190

Met Lys Ile Leu Gly Ala Val Lys Leu Phe Gly Ala Arg Gln Ser
2195 2200 2205

Thr Ser Ala Asp Ile Thr Asn Ile Asp Thr Ser Asp Ser Ile Gln
2210 2215 2220

<210> 16
<211> 2233
<212> PRT
<213> bovine parainfluenza virus 3

<400> 16

Met Asp Thr Glu Ser His Ser Gly Thr Thr Ser Asp Ile Leu Tyr Pro
1 5 10 15

Glu Cys His Leu Asn Ser Pro Ile Val Lys Gly Lys Ile Ala Gln Leu
20 25 30

His Thr Ile Met Ser Leu Pro Gln Pro Tyr Asp Met Asp Asp Asp Ser
35 40 45

Ile Leu Ile Ile Thr Arg Gln Lys Ile Lys Leu Asn Lys Leu Asp Lys
50 55 60

Arg Gln Arg Ser Ile Arg Lys Leu Arg Ser Val Leu Met Glu Arg Val
65 70 75 80

Ser Asp Leu Gly Lys Tyr Thr Phe Ile Arg Tyr Pro Glu Met Ser Ser
85 90 95

Glu Met Phe Gln Leu Cys Ile Pro Gly Ile Asn Asn Lys Ile Asn Glu
100 105 110

Leu Leu Ser Lys Ala Ser Lys Thr Tyr Asn Gln Met Thr Asp Gly Leu
115 120 125

Arg Asp Leu Trp Val Thr Ile Leu Ser Lys Leu Ala Ser Lys Asn Asp
130 135 140

Gly Ser Asn Tyr Asp Ile Asn Glu Asp Ile Ser Asn Ile Ser Asn Val
145 150 155 160

His Met Thr Tyr Gln Ser Asp Lys Trp Tyr Asn Pro Phe Lys Thr Trp
165 170 175

Phe Thr Ile Lys Tyr Asp Met Arg Arg Leu Gln Lys Ala Lys Asn Glu
180 185 190

Ile Thr Phe Asn Arg His Lys Asp Tyr Asn Leu Leu Glu Asp Gln Lys
195 200 205

Asn Ile Leu Leu Ile His Pro Glu Leu Val Leu Ile Leu Asp Lys Gln
210 215 220

Asn Tyr Asn Gly Tyr Ile Met Thr Pro Glu Leu Val Leu Met Tyr Cys
225 230 235 240

Asp Val Val Glu Gly Arg Trp Asn Ile Ser Ser Cys Ala Lys Leu Asp
245 250 255

Pro Lys Leu Gln Ser Met Tyr Tyr Lys Gly Asn Asn Leu Trp Glu Ile
260 265 270

Ile Asp Gly Leu Phe Ser Thr Leu Gly Glu Arg Thr Phe Asp Ile Ile
275 280 285

Ser Leu Leu Glu Pro Leu Ala Leu Ser Leu Ile Gln Thr Tyr Asp Pro
290 295 300

Val Lys Gln Leu Arg Gly Ala Phe Leu Asn His Val Leu Ser Glu Met
305 310 315 320

Glu Leu Ile Phe Ala Ala Glu Cys Thr Thr Glu Glu Ile Pro Asn Val
325 330 335

Asp Tyr Ile Asp Lys Ile Leu Asp Val Phe Lys Glu Ser Thr Ile Asp
340 345 350

Glu Ile Ala Glu Ile Phe Ser Phe Phe Arg Thr Phe Gly His Pro Pro
355 360 365

Leu Glu Ala Ser Ile Ala Ala Glu Lys Val Arg Lys Tyr Met Tyr Thr
370 375 380

Glu Lys Cys Leu Lys Phe Asp Thr Ile Asn Lys Cys His Ala Ile Phe
385 390 395 400

Cys Thr Ile Ile Ile Asn Gly Tyr Arg Glu Arg His Gly Gly Gln Trp
405 410 415

Pro Pro Val Thr Leu Pro Val His Ala His Glu Phe Ile Ile Asn Ala
420 425 430

Tyr Gly Ser Asn Ser Ala Ile Ser Tyr Glu Asn Ala Val Asp Tyr Tyr
435 440 445

Lys Ser Phe Ile Gly Ile Lys Phe Asp Lys Phe Ile Glu Pro Gln Leu
450 455 460

Asp Glu Asp Leu Thr Ile Tyr Met Lys Asp Lys Ala Leu Ser Pro Lys
465 470 475 480

Lys Ser Asn Trp Asp Thr Val Tyr Pro Ala Ser Asn Leu Leu Tyr Arg
485 490 495

Thr Asn Val Ser His Asp Ser Arg Arg Leu Val Glu Val Phe Ile Ala
500 505 510

Asp Ser Lys Phe Asp Pro His Gln Val Leu Asp Tyr Val Glu Ser Gly
515 520 525

Tyr Trp Leu Asp Asp Pro Glu Phe Asn Ile Ser Tyr Ser Leu Lys Glu
530 535 540

Lys Glu Ile Lys Gln Glu Gly Arg Leu Phe Ala Lys Met Thr Tyr Lys
545 550 555 560

Met Arg Ala Thr Gln Val Leu Ser Glu Thr Leu Leu Ala Asn Asn Ile
565 570 575

Gly Lys Phe Phe Gln Glu Asn Gly Met Val Lys Gly Glu Ile Glu Leu
580 585 590

Leu Lys Arg Leu Thr Thr Ile Ser Met Ser Gly Val Pro Arg Tyr Asn
595 600 605

Glu Val Tyr Asn Asn Ser Lys Ser His Thr Glu Glu Leu Gln Ala Tyr
610 615 620

Asn Ala Ile Ser Ser Ser Asn Leu Ser Ser Asn Gln Lys Ser Lys Lys
625 630 635 640

Phe Glu Phe Lys Ser Thr Asp Ile Tyr Asn Asp Gly Tyr Glu Thr Val
645 650 655

Ser Cys Phe Leu Thr Thr Asp Leu Lys Lys Tyr Cys Leu Asn Trp Arg
660 665 670

Tyr Glu Ser Thr Ala Leu Phe Gly Asp Thr Cys Asn Gln Ile Phe Gly
675 680 685

Leu Lys Glu Leu Phe Asn Trp Leu His Pro Arg Leu Glu Lys Ser Thr
690 695 700

Ile Tyr Val Gly Asp Pro Tyr Cys Pro Pro Ser Asp Ile Glu His Leu
705 710 715 720

Pro Leu Asp Asp His Pro Asp Ser Gly Phe Tyr Val His Asn Pro Lys
725 730 735

Gly Gly Ile Glu Gly Phe Cys Gln Lys Leu Trp Thr Leu Ile Ser Ile
740 745 750

Ser Ala Ile His Leu Ala Ala Val Lys Ile Gly Val Arg Val Thr Ala
755 760 765

Met Val Gln Gly Asp Asn Gln Ala Ile Ala Val Thr Thr Arg Val Pro
770 775 780

Asn Asn Tyr Asp Tyr Lys Val Lys Lys Glu Ile Val Tyr Lys Asp Val
785 790 795 800

Val Arg Phe Phe Asp Ser Leu Arg Glu Val Met Asp Asp Leu Gly His
805 810 815

Glu Leu Lys Leu Asn Glu Thr Ile Ile Ser Ser Lys Met Phe Ile Tyr
820 825 830

Ser Lys Arg Ile Tyr Tyr Asp Gly Arg Ile Leu Pro Gln Ala Leu Lys
835 840 845

Ala Leu Ser Arg Cys Val Phe Trp Ser Glu Thr Ile Ile Asp Glu Thr
850 855 860

Arg Ser Ala Ser Ser Asn Leu Ala Thr Ser Phe Ala Lys Ala Ile Glu
865 870 875 880

Asn Gly Tyr Ser Pro Val Leu Gly Tyr Val Cys Ser Ile Phe Lys Asn
885 890 895

Ile Gln Gln Leu Tyr Ile Ala Leu Gly Met Asn Ile Asn Pro Thr Ile
900 905 910

Thr Gln Asn Ile Lys Asp Gln Tyr Phe Arg Asn Ile His Trp Met Gln
915 920 925

Tyr Ala Ser Leu Ile Pro Ala Ser Val Gly Gly Phe Asn Tyr Met Ala
930 935 940

Met Ser Arg Cys Phe Val Arg Asn Ile Gly Asp Pro Thr Val Ala Ala
945 950 955 960

Leu Ala Asp Ile Lys Arg Phe Ile Lys Ala Asn Leu Leu Asp Arg Gly
965 970 975

Val Leu Tyr Arg Ile Met Asn Gln Glu Pro Gly Glu Ser Ser Phe Leu
980 985 990

Asp Trp Ala Ser Asp Pro Tyr Ser Cys Asn Leu Pro Gln Ser Gln Asn
995 1000 1005

Ile Thr Thr Met Ile Lys Asn Ile Thr Ala Arg Asn Val Leu Gln
1010 1015 1020

Asp Ser Pro Asn Pro Leu Leu Ser Gly Leu Phe Thr Ser Thr Met
1025 1030 1035

Ile Glu Glu Asp Glu Glu Leu Ala Glu Phe Leu Met Asp Arg Arg
1040 1045 1050

Ile Ile Leu Pro Arg Val Ala His Asp Ile Leu Asp Asn Ser Leu
1055 1060 1065

Thr Gly Ile Arg Asn Ala Ile Ala Gly Met Leu Asp Thr Thr Lys
1070 1075 1080

Ser Leu Ile Arg Val Gly Ile Ser Arg Gly Gly Leu Thr Tyr Asn
1085 1090 1095

Leu Leu Arg Lys Ile Ser Asn Tyr Asp Leu Val Gln Tyr Glu Thr
1100 1105 1110

Leu Ser Lys Thr Leu Arg Leu Ile Val Ser Asp Lys Ile Lys Tyr
1115 1120 1125

Glu Asp Met Cys Ser Val Asp Leu Ala Ile Ser Leu Arg Gln Lys
1130 1135 1140

Met Trp Met His Leu Ser Gly Gly Arg Met Ile Asn Gly Leu Glu
1145 1150 1155

Thr Pro Asp Pro Leu Glu Leu Leu Ser Gly Val Ile Ile Thr Gly
1160 1165 1170

Ser Glu His Cys Arg Ile Cys Tyr Ser Thr Glu Gly Glu Ser Pro
1175 1180 1185

Tyr Thr Trp Met Tyr Leu Pro Gly Asn Leu Asn Ile Gly Ser Ala
1190 1195 1200

Glu Thr Gly Ile Ala Ser Leu Arg Val Pro Tyr Phe Gly Ser Val
1205 1210 1215

Thr Asp Glu Arg Ser Glu Ala Gln Leu Gly Tyr Ile Lys Asn Leu
1220 1225 1230

Ser Lys Pro Ala Lys Ala Ala Ile Arg Ile Ala Met Ile Tyr Thr
1235 1240 1245

Trp Ala Phe Gly Asn Asp Glu Ile Ser Trp Met Glu Ala Ser Gln
1250 1255 1260

Ile Ala Gln Thr Arg Ala Asn Phe Thr Leu Asp Ser Leu Lys Ile
1265 1270 1275

Leu Thr Pro Val Thr Thr Ser Thr Asn Leu Ser His Arg Leu Lys
1280 1285 1290

Asp Thr Ala Thr Gln Met Lys Phe Ser Ser Thr Ser Leu Ile Arg
1295 1300 1305

Val Ser Arg Phe Ile Thr Ile Ser Asn Asp Asn Met Ser Ile Lys
1310 1315 1320

Glu Ala Asn Glu Thr Lys Asp Thr Asn Leu Ile Tyr Gln Gln Val
1325 1330 1335

Met Leu Thr Gly Leu Ser Val Phe Glu Tyr Leu Phe Arg Leu Glu
1340 1345 1350

Glu Ser Thr Gly His Asn Pro Met Val Met His Leu His Ile Glu
1355 1360 1365

Asp Gly Cys Cys Ile Lys Glu Ser Tyr Asn Asp Glu His Ile Asn
1370 1375 1380

Pro Glu Ser Thr Leu Glu Leu Ile Lys Tyr Pro Glu Ser Asn Glu
1385 1390 1395

Phe Ile Tyr Asp Lys Asp Pro Leu Lys Asp Ile Asp Leu Ser Lys
1400 1405 1410

Leu Met Val Ile Arg Asp His Ser Tyr Thr Ile Asp Met Asn Tyr
1415 1420 1425

Trp Asp Asp Thr Asp Ile Val His Ala Ile Ser Ile Cys Thr Ala
1430 1435 1440

Val Thr Ile Ala Asp Thr Met Ser Gln Leu Asp Arg Asp Asn Leu
1445 1450 1455

Lys Glu Leu Val Val Ile Ala Asn Asp Asp Asp Ile Asn Ser Leu
1460 1465 1470

Ile Thr Glu Phe Leu Thr Leu Asp Ile Leu Val Phe Leu Lys Thr
1475 1480 1485

Phe Gly Gly Leu Leu Val Asn Gln Phe Ala Tyr Thr Leu Tyr Gly
1490 1495 1500

Leu Lys Ile Glu Gly Arg Asp Pro Ile Trp Asp Tyr Ile Met Arg
1505 1510 1515

Thr Leu Lys Asp Thr Ser His Ser Val Leu Lys Val Leu Ser Asn
1520 1525 1530

Ala Leu Ser His Pro Lys Val Phe Lys Arg Phe Trp Asp Cys Gly
1535 1540 1545

Val Leu Asn Pro Ile Tyr Gly Pro Asn Thr Ala Ser Gln Asp Gln
1550 1555 1560

Val Lys Leu Ala Leu Ser Ile Cys Glu Tyr Ser Leu Asp Leu Phe
1565 1570 1575

Met Arg Glu Trp Leu Asn Gly Ala Ser Leu Glu Ile Tyr Ile Cys
1580 1585 1590

Asp Ser Asp Met Glu Ile Ala Asn Asp Arg Arg Gln Ala Phe Leu
1595 1600 1605

Ser Arg His Leu Ala Phe Val Cys Cys Leu Ala Glu Ile Ala Ser
1610 1615 1620

Phe Gly Pro Asn Leu Leu Asn Leu Thr Tyr Leu Glu Arg Leu Asp
1625 1630 1635

Glu Leu Lys Gln Tyr Leu Asp Leu Asn Ile Lys Glu Asp Pro Thr
1640 1645 1650

Leu Lys Tyr Val Gln Val Ser Gly Leu Leu Ile Lys Ser Phe Pro
1655 1660 1665

Ser Thr Val Thr Tyr Val Arg Lys Thr Ala Ile Lys Tyr Leu Arg
1670 1675 1680

Ile Arg Gly Ile Asn Pro Pro Glu Thr Ile Glu Asp Trp Asp Pro
1685 1690 1695

Ile Glu Asp Glu Asn Ile Leu Asp Asn Ile Val Lys Thr Val Asn
1700 1705 1710

Asp Asn Cys Ser Asp Asn Gln Lys Arg Asn Lys Ser Ser Tyr Phe
1715 1720 1725

Trp Gly Leu Ala Leu Lys Asn Tyr Gln Val Val Lys Ile Arg Ser
1730 1735 1740

Ile Thr Ser Asp Ser Glu Val Asn Glu Ala Ser Asn Val Thr Thr
1745 1750 1755

His Gly Met Thr Leu Pro Gln Gly Gly Ser Tyr Leu Ser His Gln
1760 1765 1770

Leu Arg Leu Phe Gly Val Asn Ser Thr Ser Cys Leu Lys Ala Leu
1775 1780 1785

Glu Leu Ser Gln Ile Leu Met Arg Glu Val Lys Lys Asp Lys Asp
1790 1795 1800

Arg Leu Phe Leu Gly Glu Gly Ala Gly Ala Met Leu Ala Cys Tyr
1805 1810 1815

Asp Ala Thr Leu Gly Pro Ala Ile Asn Tyr Tyr Asn Ser Gly Leu
1820 1825 1830

Asn Ile Thr Asp Val Ile Gly Gln Arg Glu Leu Lys Ile Phe Pro
1835 1840 1845

Ser Glu Val Ser Leu Val Gly Lys Lys Leu Gly Asn Val Thr Gln
1850 1855 1860

Ile Leu Asn Arg Val Arg Val Leu Phe Asn Gly Asn Pro Asn Ser
1865 1870 1875

Thr Trp Ile Gly Asn Met Glu Cys Glu Ser Leu Ile Trp Ser Glu
1880 1885 1890

Leu Asn Asp Lys Ser Ile Gly Leu Val His Cys Asp Met Glu Gly
1895 1900 1905

Ala Ile Gly Lys Ser Glu Glu Thr Val Leu His Glu His Tyr Ser
1910 1915 1920

Ile Ile Arg Ile Thr Tyr Leu Ile Gly Asp Asp Asp Val Val Leu
1925 1930 1935

Val Ser Lys Ile Ile Pro Thr Ile Thr Pro Asn Trp Ser Lys Ile
1940 1945 1950

Leu Tyr Leu Tyr Lys Leu Tyr Trp Lys Asp Val Ser Val Val Ser
1955 1960 1965

Leu Lys Thr Ser Asn Pro Ala Ser Thr Glu Leu Tyr Leu Ile Ser
1970 1975 1980

Lys Asp Ala Tyr Cys Thr Val Met Glu Pro Ser Asn Leu Val Leu
1985 1990 1995

Ser Lys Leu Lys Arg Ile Ser Ser Ile Glu Glu Asn Asn Leu Leu
2000 2005 2010

Lys Trp Ile Ile Leu Ser Lys Arg Lys Asn Asn Glu Trp Leu Gln
2015 2020 2025

His Glu Ile Lys Glu Gly Glu Arg Asp Tyr Gly Ile Met Arg Pro
2030 2035 2040

Tyr His Thr Ala Leu Gln Ile Phe Gly Phe Gln Ile Asn Leu Asn
2045 2050 2055

His Leu Ala Arg Glu Phe Leu Ser Thr Pro Asp Leu Thr Asn Ile
2060 2065 2070

Asn Asn Ile Ile Gln Ser Phe Thr Arg Thr Ile Lys Asp Val Met
2075 2080 2085

Phe Glu Trp Val Asn Ile Thr His Asp Asn Lys Arg His Lys Leu
2090 2095 2100

Gly Gly Arg Tyr Asn Leu Phe Pro Leu Lys Asn Lys Gly Lys Leu
2105 2110 2115

Arg Leu Leu Ser Arg Arg Leu Val Leu Ser Trp Ile Ser Leu Ser
2120 2125 2130

Leu Ser Thr Arg Leu Leu Thr Gly Arg Phe Pro Asp Glu Lys Phe
2135 2140 2145

Glu Asn Arg Ala Gln Thr Gly Tyr Val Ser Leu Ala Asp Ile Asp
2150 2155 2160

Leu Glu Ser Leu Lys Leu Leu Ser Arg Asn Ile Val Lys Asn Tyr
2165 2170 2175

Lys Glu His Ile Gly Leu Ile Ser Tyr Trp Phe Leu Thr Lys Glu
2180 2185 2190

Val Lys Ile Leu Met Lys Leu Ile Gly Gly Val Lys Leu Leu Gly
2195 2200 2205

Ile Pro Lys Gln Tyr Lys Glu Leu Glu Asp Arg Ser Ser Gln Gly
2210 2215 2220

Tyr Glu Tyr Asp Asn Glu Phe Asp Ile Asp
2225 2230

<210> 17

<211> 29

<212> RNA

<213> human metapneumovirus

<400> 17

cauauuuuaau cuaagguuuu uuuauauaccc

29

<210> 18

<211> 44

<212> RNA

<213> human metapneumovirus

<400> 18

ugcgcuuuuu uugcgcauau uuaauucaau guuuuuuuugu accc

44

<210> 19

<211> 44

<212> RNA

<213> avian metapneumovirus

<400> 19

ugcucuuuuu uugcguagua ucguccaaga ucuuuuuuauu accc

44

<210> 20

<211> 47

<212> RNA

<213> human respiratory syncytial virus strain A2

<400> 20

ugcgcuuuuu uacgcauguu guuugaacgu auuugguuuu uuuaccc

47

<210> 21

<211> 33

<212> RNA

<213> human metapneumovirus

<400> 21

ccguauacau ucaauuuauaa uuucuuuauuu uua

33

<210> 22

<211> 45

<212> RNA

<213> human metapneumovirus

<400> 22

acggcaaaaa aaccguauac auucaauuau aauuucuuau uuuua

45

<210> 23

<211> 45

<212> RNA

<213> avian metapneumovirus

<400> 23

acgagaaaaa aaccguauuc aucaaauuuu uagcuuuuag uuuuu

45

<210> 24

<211> 46

<212> RNA

<213> human respiratory syncytial virus strain A2

<400> 24

acgagaaaaa aagugucaaa aacuaauauc ucguauuuua guuaau

46

<210> 25
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> HMPV strain 83 gene start consensus sequence.

<400> 25
atgggacaag tgaaaaatgtc 20

<210> 26
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> HMPV strain 83 gene start consensus sequence with alternative assignments.

<400> 26
gcgagataaa tagttatgga 20

<210> 27
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> HMPV strain 83 gene start consensus sequence with alternative assignments.

<400> 27
tagggacaag tcacaatgtat 20

<210> 28
<211> 17
<212> DNA
<213> Artificial Sequence

<220>
<223> HMPV strain 83 gene end consensus sequence.

<400> 28
tttagttaatt aaaaata 17

<210> 29
<211> 17
<212> DNA
<213> Artificial Sequence

<220>
<223> HMPV strain 83 gene end consensus sequence with alternative assignments.

<400> 29

agagtattaa taaaacc

17

<210> 30

<211> 17

<212> DNA

<213> Artificial Sequence

<220>

<223> HMPV strain 83 gene end consensus sequence with alternative assignments.

<400> 30

gaagttagct aaaaagt

17

<210> 31

<211> 10

<212> DNA

<213> human respiratory syncytial virus

<400> 31

ggggcaaata

10

<210> 32

<211> 17

<212> DNA

<213> Artificial Sequence

<220>

<223> HMPV strain 83 gene start consensus sequence.

<400> 32

tgagacaagt gaaaatg

17

<210> 33

<211> 46

<212> DNA

<213> Artificial Sequence

<220>

<223> Synthetic oligonucleotide.

<400> 33

cccggggacg tcctagctag ctagggtacc ccgctcgagc ggtccg

46

<210> 34

<211> 13

<212> DNA

<213> Artificial Sequence

<220>

<223> HMPV gene end consensus sequence.

<220>

<221> misc_feature

<222> (6)..(8)
<223> n is a, c, g, or t

<400> 34
agttannnaa aaa

13

<210> 35
<211> 16
<212> DNA
<213> Artificial Sequence

<220>
<223> HMPV gene start consensus sequence.

<220>
<221> misc_feature
<222> (8)..(8)
<223> n is a, c, g, or t

<220>
<221> misc_feature
<222> (10)..(12)
<223> n is a, c, g, or t

<400> 35
gggacaantn nnaatg

16

<210> 36
<211> 13350
<212> DNA
<213> human metapneumovirus

<400> 36
gtataaatta gattccaaaa aaatatggga caagtaaaaa tgtctttca agggattcac 60
ctgagtgatt tatcatacaa gcatgctata taaaagagt ctcagcac aataaaaaga 120
gatgtggta caacaactgc agtgacaccc tcatcattgc aacaagaaat aacactgtt 180
tgtggagaaa ttctgtatgc taaacatgct gactacaaat atgctgcaga aataggaata 240
caatatatta gcacagctt aggatcagag agagtgcagc agattctgag gaactcaggc 300
agtgaagtcc aagtggtctt aaccagaacg tactctctgg ggaaaattaa aaacaataaa 360
ggagaagatt tacagatgtt agacatacac gggtagaga agagctgggt agaagagata 420
gacaaagaag caagggaaac aatggcaacc ttgcttaagg aatcatcagg taatatccca 480
caaaatcaga ggcctcagc accagacaca cccataatct tattatgtgt aggtgcctta 540
atattcacta aactagcatc aaccatagaa gtggactag agaccacagt cagaaggc 600
aaccgtgtac taagtgtatgc actcaagaga taccctagaa tggacatacc aaagattgcc 660
agatccttct atgacttatt tgaacaaaaa gtgtatcaca gaagtttggcattgagtat 720

ggcaaagcat taggctcatc atctacaggc agcaaagcag aaagtctatt tgtaatata	780
ttcatgcaag cttatgggc cggtaaaca atgctaaggt ggggggtcat tgccaggta	840
tccacaata taatgttagg acatgtatcc gtccaaagctg agttaaaaca ggtcacagaa	900
gtctatgact tggcgaga aatggccct gaatctggac ttctacattt aaggcaaagc	960
ccaaaagctg gactgttatac actagccaac tgtccaaact ttgcaagtgt tggtctcgga	1020
aatgcctcag gcttaggcat aatcggtatg tatcgaggaa gagtacaaaa cacagaatta	1080
tttcagcag ctgaaagtta tgccaaaagt ttgaaagaaa gcaataaaat aaatttctct	1140
tcattaggac ttacagatga agagaaagag gctgcagaac atttctaaa tgtgagtgac	1200
gacagtcaaa atgattatga gtaattaaaa aagtggaca agtcaaaatg tcattccctg	1260
aaggaaaaaga tattctttc atggtaatg aagcagcaaa attagcagaa gctttccaga	1320
aatcattaag aaaaccaggt cataaaagat ctcaatctat tataggagaa aaagtgaata	1380
ctgtatcaga aacattggaa ttacctacta tcagtagacc tgcaaaacca accataccgt	1440
cagaaccaaa gtagcatgg acagataaag gtggggcaac caaaaactgaa ataaagcaag	1500
caatcaaagt catggatccc attgaagaag aagagtctac cgagaagaag gtgctaccct	1560
ccagtgtatgg gaaaacccct gcagaaaaa aactgaaacc atcaactaac accaaaaaaga	1620
aggttcatt tacaccaaata acccaggaa aatatacaaa gttggaaaaa gatgctctag	1680
atttgctctc agataatgaa gaagaagatg cagaatcttc aatcttaacc tttgaagaaa	1740
gagatacttc atcattaagc attgaggcca gattggaatc aatagaggag aaattaagca	1800
tgatattagg gctattaaga acactcaaca ttgctacagc aggacccaca gcagcaagag	1860
atgggatcag agatgcaatg attggcgtaa gagaggaatt aatagcagac ataataaagg	1920
aagctaaagg gaaagcagca gaaatgatgg aagagggaaat gagtcaacga tcaaaaatag	1980
gaaatggtag tgtaaaatta acagaaaaag caaaagagct caacaaaatt gttgaagatg	2040
aaagcacaag tggagaatcc gaagaagaag aagaacccaa agacacacaa gacaatagtc	2100
aagaagatga catttaccag ttaattatgt agttaataa aaataaacaa tggacaagt	2160
aaaaatggag tcctacctag tagacaccta tcaaggcatt cttacacag cagctgtca	2220
agttgatcta atagaaaagg acctgttacc tgcaagccta acaatatggt tccctttgtt	2280
tcaggccaac acaccaccag cagtgtgct cgatcagcta aaaaccctga caataaccac	2340
tctgtatgct gcatcacaaa atggtccaaat actcaaagtg aatgcacatcag cccaaagggtgc	2400
agcaatgtct gtacttccca aaaaattga agtcaatgcg actgttagcac tcgatgaata	2460
tagcaaactg gaatttgaca aactcacagt ctgtgaagta aaaacagttt acttaacaac	2520

catgaaacca tacgggatgg tatcaaaatt tgtgagctca gccaaatcg ttggcaaaaa	2580
aacacatgat ctaatcgcac tatgtgattt tatggatcta gaaaagaaca cacctgttac	2640
aataccagca ttcataat cagttcaat caaagagagt gagtcagcta ctgttgaagc	2700
tgctataagc agtgaagcag accaagctct aacacaggcc aaaattgcac cttatgcggg	2760
attaattatg atcatgacta tgaacaatcc caaaggcata ttcaaaaagc ttggagctgg	2820
gactcaagtc atagtagaaac taggagcata tgtccaggct gaaagcataa gcaaaaatatg	2880
caagacttgg agccatcaag ggacaagata tgtcttgaag tccagataac aaccaagcac	2940
cttggccaag agctactaac cctatctcat agatcataaa gtcaccattc tagttatata	3000
aaaatcaagt tagacaaca attaaatcaa tcaagaacgg gacaaataaa aatgtcttgg	3060
aaagtggta tcatttttc attgttaata acacctcaac acggctttaa agagagctac	3120
ttagaagagt catgttagcac tataactgaa ggatatctca gtgttctgag gacaggttgg	3180
tacaccaatg ttttacact ggaggttaggc gatgtagaga accttacatg tgccgatgga	3240
cccgcttaa taaaaacaga attagacctg accaaaagtg cactaagaga gctcagaaca	3300
gtttctgctg atcaactggc aagagaggag caaattgaaa atccagaca atctagattc	3360
gttctaggag caatagcact cggtgttgca actgcagctg cagttacagc aggtgttgc	3420
attgccaaaa ccatccggct tgaaagtgaa gtaacagcaa ttaagaatgc cctcaaaaag	3480
accaatgaag cagtatctac attggggat ggagttcgtg tggtggcaac tgcagtgaga	3540
gagctgaaag attttgtgag caagaatcta acacgtgcaa tcaacaaaaa caagtgcgac	3600
attgctgacc tgaaaatggc cgtagcttc agtcaattca acagaaggtt cctaaatgtt	3660
gtgcggcaat tttcagacaa cgctggaata acaccagcaa tatctttgga cttaatgaca	3720
gatgctgaac tagccagagc tgtttccaac atgccaacat ctgcaggaca aataaaactg	3780
atgttggaga accgtgcaat ggtaagaaga aaagggttcg gattcctgat aggagttac	3840
ggaagctccg taatttacat ggtgcaactg ccaatcttg gggttataga cacgccttgc	3900
tggatagtaa aagcagcccc ttcttggta gaaaaaaagg gaaactatgc ttgcctctta	3960
agagaagacc aaggatggta ttgtcaaaat gcagggtcaa ctgtttacta cccaaatgaa	4020
aaagactgtg aaacaagagg agaccatgtc ttttgcgaca cagcagcagg aatcaatgtt	4080
gctgagcagt caaaggagtg caacataaac atatctacta ctaattaccc atgcaaagtt	4140
agcacaggaa gacatcctat cagtaggtt gcactatctc ctcttgggc tttgggtgct	4200
tgctacaagg gagtgagctg ttccattggc agcaacagag tagggatcat caagcaactg	4260
aacaaaggct gctcttatata accaaaccaa gacgcagaca cagtgacaat agacaacact	4320

gtataccagc taagcaaagt tgaagggcaa cagcatgtta taaaaggaag gccagtgtca	4380
agcagcttg acccagtcaa gtttcctgaa gatcaattca atgttgcact tgaccaagtt	4440
ttcgagagca ttgagaacag tcaggcctt gttggatcaat caaacagaat cctaagcagt	4500
gcagagaaag gaaacactgg cttcatcatt gtaataattc taattgctgt cttggctct	4560
accatgatcc tagtgagtgt ttttatcata ataaagaaaa caaagaaacc cacaggagca	4620
cctccagagc tgagtggtgt cacaaacaat ggcttcatac cacataatta gttaaattaa	4680
aataaagtaa attaaaataa attaaaatta aaaataaaaaa tttgggacaa atcataatgt	4740
ctcgcaaggc tccgtgcaaa tatgaagtgc ggggcaaatg caatagagga agtgagtgca	4800
agtttaacca caattactgg agttggccag atagatactt attaataaga tcaaattatt	4860
tattaaatca acttttaagg aacactgata gagctgatgg cttatcaata atatcaggag	4920
caggcagaga agataggaca caagattttgc tcctaggttc caccaatgtg gttcaagggtt	4980
atattgatga taaccaaagc ataacaaaag ctgcagcctg ttacagtcta cataatataa	5040
tcaaacaact acaagaagtt gaagtttaggc aggctagaga taacaaacta tctgacagca	5100
aacatgtac acttcacaac ttagtcctat cttatatggat gatgagcaaa actcctgcata	5160
ctttaatcaa caatctcaag agactgccga gagagaaact gaaaaaatta gcaaagctca	5220
taattgactt atcagcaggt gctgaaaatg actcttcata tgccttgcaa gacagtgaaa	5280
gcactaatca agtgcagtga gcatggtcca gtttcattat ctagatagggt tgatgacatg	5340
atatggactc acaaggactt aaaagaagct ttatctgatg ggatagtgaa gtctcataact	5400
aacatttaca attgttattt agaaaacata gaaattatataatgtcaaggc ttacttaagt	5460
tagaaaaac acatcagagt gggataaaatg acaatgataa cattagatgt cattaaaagt	5520
gatgggtctt caaaaacatg tactcacctc aaaaaaataa tttaaagacca ctctggtaaa	5580
gtgcttattt tacttaagtt aatattagct ttactaacat ttctcacagt aacaatcacc	5640
atcaattata taaaagtggaa aaacaatctg caaatatgcc agtcaaaaac tgaatcagac	5700
aaaaaggact catcatcaa taccacatca gtcacaacca agactactct aaatcatgat	5760
atcacacagt attttaaaag tttgattcaa aggtatacaa actctgcaat aaacagtgac	5820
acatgctgga aaataaacag aaatcaatgc acaaataataa caacatacaa atttttatgt	5880
tttaaatctg aagacacaaa aaccaacaat tggataaac tgacagattt atgcagaaac	5940
aaaccaaaaac cagcagttgg agtgtatcac atagtagaaat gccattgtat atacacagtt	6000
aaatggaagt gctatcatta cccaaaccgat gaaacccaaat cctaaatgtt aacaccagat	6060
taggatccat ccaagtctgt tagttcaaca atttagttat ttaaaaatataat tttgaaaaca	6120

agtaagttc tatgatactt cataataata agtaataatt aattgcttaa tcatcatcac	6180
aacattattc gaaaccataa ctattcaatt taaaaagtaa aaaacaataa catgggacaa	6240
gtagttatgg aggtgaaagt ggagaacatt cgaacaatag atatgctaa agcaagagta	6300
aaaaatcgta tggcacgcag caaatgctt aaaaatgcct ctttggtcct cataggaata	6360
actacattga gtattgccct caatatctat ctgatcataa actataaaat gcaaaaaaac	6420
acatctgaat cagaacatca caccagctca tcacccatgg aatccagcag agaaaactcca	6480
acggtccccca cagacaactc agacaccaac tcaagcccac agcatccaac tcaacagtcc	6540
acagaaggct ccacactcta ctttgcagcc tcagcaagct caccagagac agaaccaaca	6600
tcaacaccag atacaacaaa ccgcccggcc ttcgtcgaca cacacacaac accaccaagc	6660
gcaaggcagaa caaagacaag tccggcagtc cacacaaaaa acaacccaag gacaagctct	6720
agaacacatt ctccaccacg ggcaacgaca aggacggcac gcagaaccac cactctccgc	6780
acaaggcagca caagaaagag accgtccaca gcatcagtcc aacctgacat cagcgcaaca	6840
acccacaaaaa acgaagaagc aagtccagcg agcccacaaa catctgcaag cacaacaaga	6900
atacaaagga aaagcgtgga ggccaacaca tcaacaacat acaaccaaac tagttaacaa	6960
aaaatacaaa ataaactctaa gataaaccat gcagacacca acaatggaga agccaaaaga	7020
caattcaca tctccccaaa aaggcaacaa caccatatta gctctgccc aatctccctg	7080
aaaaaaacac tcgccccat accaaaaata ccacaaccac cccaaagaaaa aaactgggca	7140
aaacaacacc caagagacaa ataacaatgg atcctctcaa tgaatccact gttaatgtct	7200
atcttcctga ctcatatctt aaaggagtga ttccctttag tgagactaat gcaattggtt	7260
catgtctctt aaaaagacct tacctaaaaa atgacaacac tgcaaaagtt gccatagaga	7320
atcctgttat cgagcatgtt agactcaaaa atgcagtcaa ttctaaagatg aaaatatcag	7380
attacaagat agtagagcca gtaaacatgc aacatgaaat tatgaagaat gtacacagtt	7440
gtgagctcac attattaaaa cagttttaa caaggagtaa aaatattagc actctcaaatt	7500
taaatatgat atgtgattgg ctgcagttaa agtctacatc agatgatacc tcaatcctaa	7560
gtttataga tgtagaattt atacctagct gggtaagcaa ttgggttagt aattggtaca	7620
atctcaacaa gttgattctg gaattcagga aagaagaagt aataagaact gttcaatct	7680
tgtgtaggc attgggtaaa ttgttttg ttgtatcatc atatggatgt atagtcaaga	7740
gcaacaaaaag caaaagagtg agcttcttca catacaatca actgttaaca tggaaagatg	7800
tgatgttaag tagattcaat gcaaattttt gtatatgggt aagcaacagt ctgaatgaaa	7860
atcaagaagg gctagggttg agaagtaatc tgcaaggcat attaactaat aagctatatg	7920

aaactgtaga ttatatgctt agtttatgtt gcaatgaagg tttctcactt gtgaaagagt 7980
tcgaaggctt tattatgagt gaaattctta ggattactga acatgctcaa ttcagacta 8040
gatttagaaa tactttatta aatggattaa ctgatcaatt aacaaaatta aaaaataaaa 8100
acagactcag agttcatggt accgtgttag aaaataatga ttatccaatg tacgaagttg 8160
tacttaagtt attaggagat actttgagat gtattaaatt attaatcaat aaaaacttag 8220
agaatgctgc tgaattatac tatataattt gaatattcgg tcacccaatg gtagatgaaa 8280
gagatgcaat ggatgctgtc aaattaaaca atgaaatcac aaaaatcctt aggtggaga 8340
gcttgacaga actaagaggg gcattcatat taaggattat caaaggattt gtagacaaca 8400
acaaaagatg gcccaaatt aaaaacttaa aagtgccttag taagagatgg actatgtact 8460
tcaaagcaaa aagttacccc agtcaacttg aattaagcga acaagatttt ttagagctt 8520
ctgcaataca gtttgaacaa gagtttctg tccctgaaaa aaccaacctt gagatggtat 8580
taaatgataa agctatatca ctcctaaaa gattaatatg gtctgtgtat ccaaaaaatt 8640
acttacctga gaaaataaaa aatcgatatc tagaagagac tttcaatgca agtgatagtc 8700
tcaaaacaag aagagtacta gagtactatt tgaaagataa taaattcgac caaaaagaac 8760
ttaaaagtta tgttgttaaa caagaatatt taaatgataa ggatcatatt gtctcgctaa 8820
ctggaaaaga aagagaattha agttaggtt gaatgtttgc tatgcaacca ggaaaacagc 8880
gacaaataca aatattggct gaaaaattgt tagctgataa tattgtacct ttttcccg 8940
aaaccttaac aaagtatggt gatctagatc ttcagagaat aatggaaatc aaatcggaac 9000
tttcttctat taaaactaga agaaatgata gttataataa ttacattgca agagcatcca 9060
tagtaacaga tttaaagtaag ttcaaccaag ccttaggtt tgaaactaca gcgatctgt 9120
cgatgttagc agatgaacta catggaacac aaagcctatt ctgttggta catcttac 9180
tccctatgac aacaatgata tgtgcctata gacatgcacc accagaaaca aaaggtgaat 9240
atgatataga taagatagaa gagcaaagtg gtttatatag atatcatatg ggtggattt 9300
aaggatggtg tcaaaaactc tggacaatgg aagctatatc tctatttagat gttgtatctg 9360
taaaaacacg atgtcaaatg acatctttaa taaacggtga caaccaatca atagatgtaa 9420
gtaaaccagt taagttatct gagggtttag atgaagtgaa agcagattat agcttggctg 9480
taaaaatgtt aaaagaaaata agagatgcat acagaaatat aggccataaaa cttaaagaag 9540
gggaaacata tatatacaga gatcttcagt ttataagtaa ggtgattcaa tctgaaggag 9600
taatgcatttcc taccctata aaaaagatct taagagtggg accatggata aacacaatata 9660
tagatgacat taaaaccagt gcagagtcaa tagggagtct atgtcaggaa tttagaattta 9720

ggggggaaag cataatagtt agtctgatat taaggaattt ttggctgtat aatttataca	9780
tgcatgaatc aaagcaacac cccctagcag ggaagcagtt attcaaacaa ctaaataaaa	9840
cattaacatc agtgcagaga tttttgaaa taaaaaagga aatgaagta gtagatctat	9900
gatgaacat accaatgcag tttggaggag gagatccagt agtcttctat agatcttct	9960
atagaaggac ccctgatttt ttaactgaag caatcagtca tgtggatatt ctgttaagaa	10020
tatcagccaa cataagaaat gaagcgaaaa taagtttctt caaagcctta ctgtcaatag	10080
aaaaaaaaatga acgtgctaca ctgacaacac taatgagaga tcctcaagct gttggctcag	10140
agcgacaagc aaaagtaaca agtgcata atagaacagc agttaccagc atcttaagtc	10200
tttctccaaa tcaactttc agcgatagtg ctatacacta cagtagaaat gaagaagagg	10260
tcggaatcat tgctgacaac ataacacctg tttatcctca tggactgaga gttttgtatg	10320
aatcattacc ttttcataaa gctgaaaaag ttgtgaatat gatatcagga acgaaatcca	10380
taaccaactt attacagaga acatctgcta ttaatggtga agatattgac agagctgtat	10440
ccatgatgct ggagaaccta ggattattat ctagaatatt gtcagtagtt gttgatagta	10500
tagaaattcc aaccaaattct aatggtaggc tgatatgttgc tagatatct agaaccctaa	10560
gggagacatc atggaataat atggaaatag ttggagtaac atcccctagc atcactacat	10620
gcatggatgt catatatgca actagctctc atttgaaagg gataatcatt gaaaagttca	10680
gcactgacag aactacaaga ggtcaaagag gtccaaagag cccttggta gggtcgagca	10740
ctcaagagaa aaaatttagtt cctgtttata acagacaaat tcttcaaaa caacaaagag	10800
aacagctaga agcaatttggaa aaaatgagat ggttatataa agggacacca ggtttaagac	10860
gattactcaa taagatttgt cttggaaagtt taggcattag ttacaaatgt gtaaaacctt	10920
tattacctag gtttatgagt gtaaatttcc tacacaggtt atctgtcagt agtagaccta	10980
tggaaattccc agcatcagtt ccagttata gaacaacaaa ttaccatttt gacactagtc	11040
ctattaatca agcactaagt gagagatttgg ggaatgaaga tattaatttgc tcttc当地	11100
atgcaatcag ctgtggaaattt agcataatga gtgttagtaga acaattaact ggttaggagtc	11160
caaaacagtt agtttaataa cctcaattttt aagaaataga cattatgcca ccaccagtgt	11220
ttcaaggaa attcaattttt aagcttagtag ataagataac ttctgtatcaa catatctca	11280
gtccagacaa aatagatatg ttaacactgg gaaaaatgct catgcccact ataaaaggc	11340
agaaaaacaga tcagttccctg aacaagagag agaatttattt ccatggaaat aatcttatttgc	11400
agtctttgtc agcagcgtta gcatgtcatt ggtgtggat attaacagag caatgtatag	11460
aaaataatat tttcaagaaa gactgggtg acgggttcat atcggatcat gcttttatgg	11520

aaaataagaa attataattg gatgtatacg

13350